

**SPECIAL ISSUE**

# BYTE

THE WORLDWIDE COMPUTING AUTHORITY

Includes  
**Buyer's Guide**  
Section  
Page 128

# ESSENTIAL GUIDE TO WINDOWS

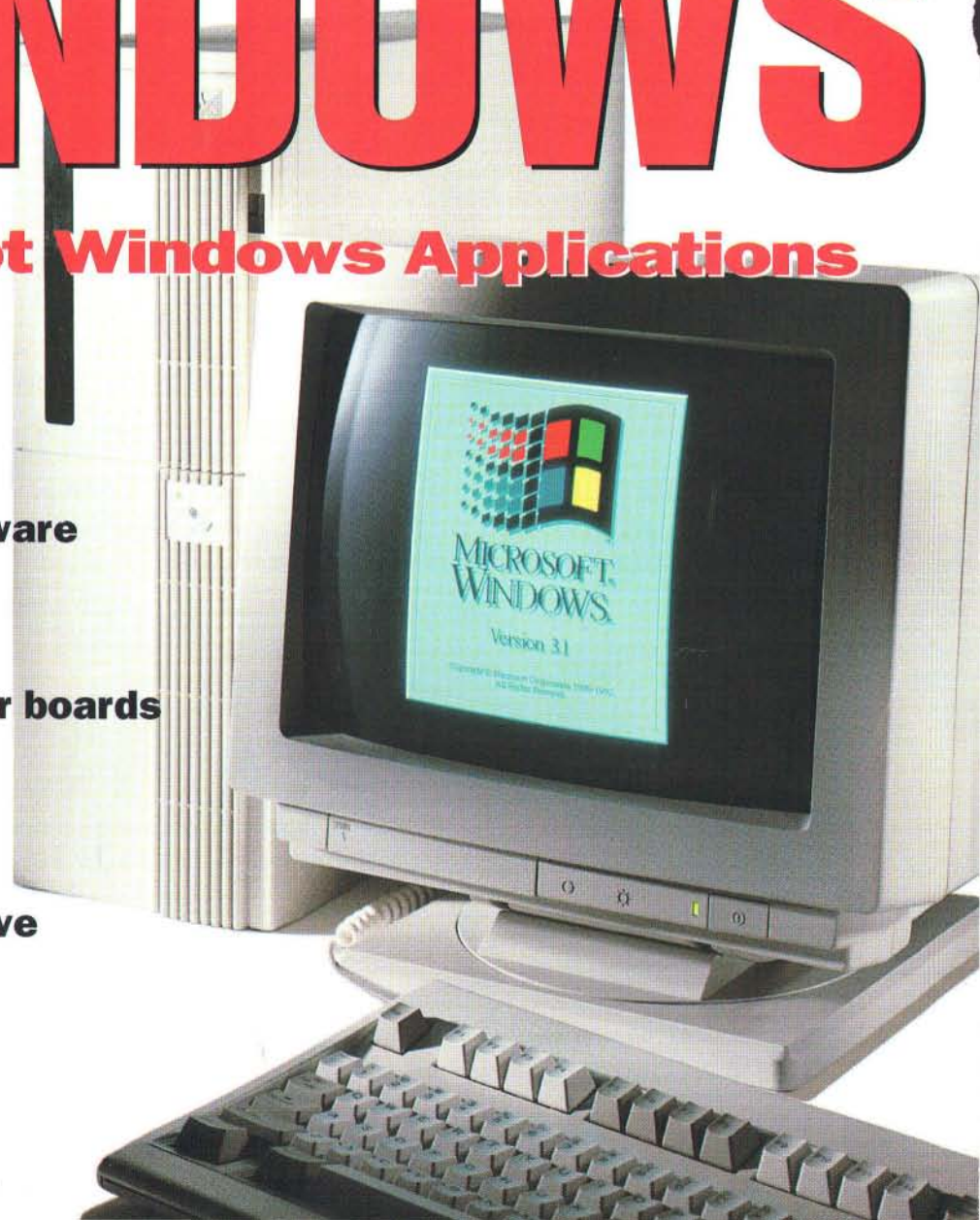
**128 Hot Windows Applications**

**REVIEWS:**

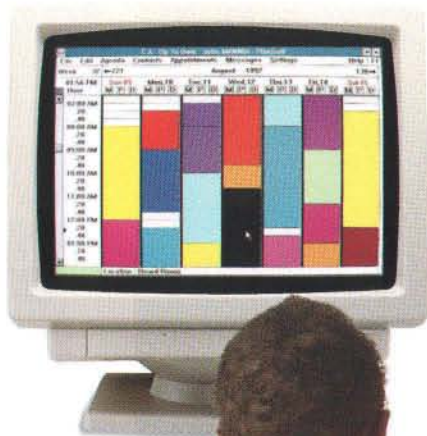
**Image-editing software**  
**Spreadsheets**  
**Word processors**  
**Project managers**  
**A dozen 24-bit color boards**  
**15 Windows books**

**FEATURES:**

**Windows NT**  
**The OS/2 Alternative**



# Open Our Windows.



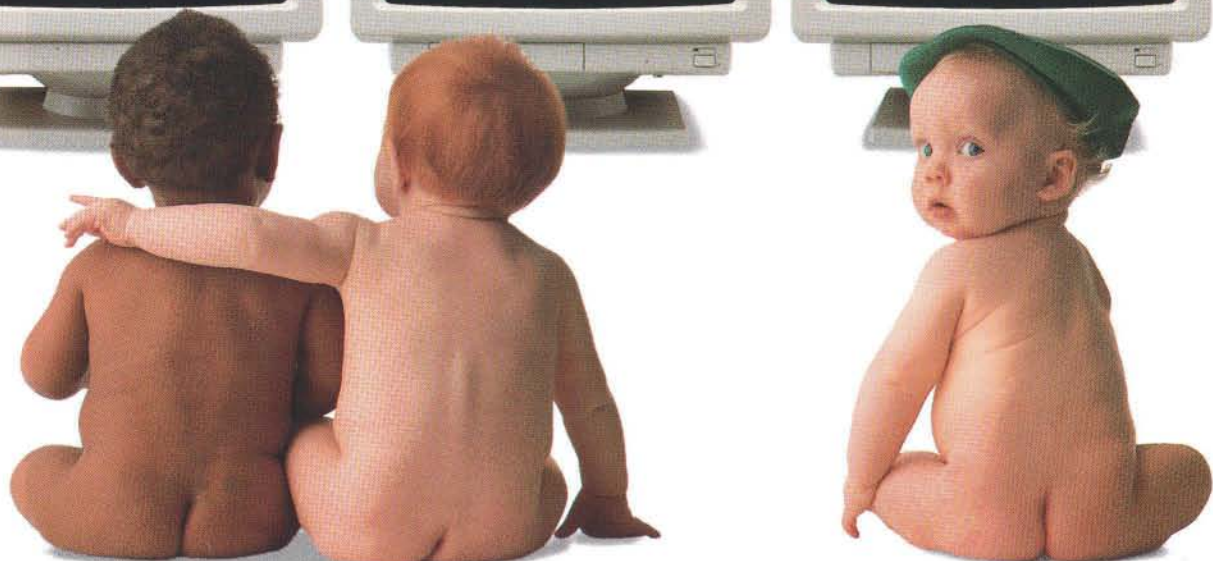
*Future Executive*



*Future Project Manager*



*Future Artist*



your computer a lot friendlier – and your life a little easier.

Behind all of these wonderful Windows stands the world's leading software company, Computer Associates.

With service and support that goes around the clock and around the world, CA is the

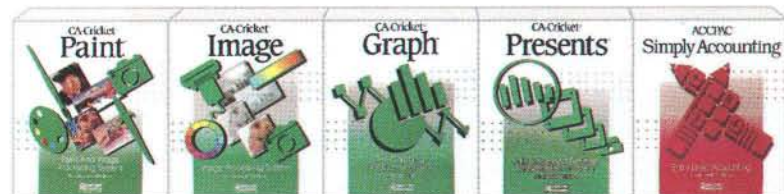
software company that more than 95% of the Fortune 500 depend on.

**Dial 1-800 CALL CAI Today  
For A Free Demo Disk.**

So, pick up the phone right now and order a free Demo Disk that will show you just how easy it is.

It's the Windows software that anyone can use.

And we mean anyone.



*Paint, draw and re-touch masterpieces with 24-bit color, 8-bit gray-scale, toolboxes and anti-aliased text control.*

*Creating a brand new image for yourself is a breeze with powerful tools for image conditioning and color reduction.*

*Making vivid 3-D pie charts is now a piece of cake. Choose from 12 chart types, plus hundreds of vibrant colors and fonts.*

*Create stunning slide shows in seconds with pre-designed templates, or import graphics and scanned images.*

*Balancing the books has never been simpler. It's the accounting software that's perfect for almost any small business.*

**COMPUTER ASSOCIATES**  
Software superior by design.

# Anyone Can Operate



*Future Database Consultant*

*Future Author*

*Future Entrepreneur*

It's that easy.

Introducing the friendliest, easiest, biggest family of Windows software you'll ever meet.

The CA Family of Windows software.

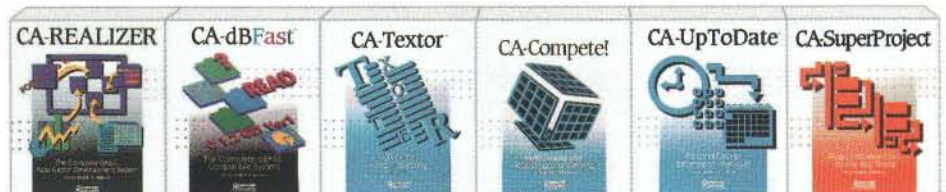
Covering virtually every category from accounting to database to word processing to graphics, CA Windows software sets the standard for ease of use.

If you can click a mouse, CA Windows software can help you work smarter, faster and more efficiently than you ever thought possible.



Underneath the simple, user-friendly interface lies some of the most advanced and powerful Windows technology in the industry.

Literally hundreds of dazzling push buttons, floating windows, pull-down menus, pop-up dialog boxes, colors, fonts and graphics, all designed with the same basic goals: Making



*BASIC* apps light up with Windows, buttons, boxes, bit-maps, charts, animation and graphic tablets.

Breathe new life into old dBASE apps with CA-dBFast's™ colorful windows, buttons, dialog boxes and bitmap pictures.

CA-Textox™'s™ scalable fonts, table editor and customizable toolbar mean it's never been easier to write like a pro.

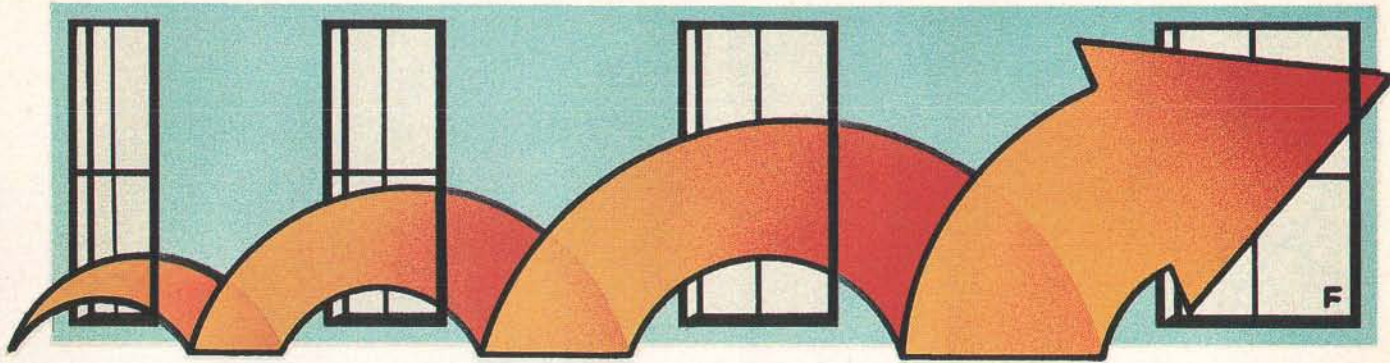
It's as friendly as a spreadsheet, but you can view and model up to 12 dimensions of data with new CA-Compete!™

Meet CA-UpToDate™, the easiest and most colorful way to manage time, people and resources throughout your company.

Advanced algorithms and stunning graphics make it the most efficient and friendliest project manager in the business.

There's  
One Small  
Difference  
Between Us  
And The  
Competition.





# BYTE's Essential Guide to Windows

## S P E C I A L I S S U E

- |     |   |     |  |
|-----|---|-----|--|
| 6   | <b>EDITORIAL: BYTE Focuses on Windows</b>   | 70  | <b>REVIEWS</b><br><b>Spreadsheets Under Scrutiny</b><br>BY NICHOLAS DELONAS      |
| 12  | <b>WINDOWS News &amp; Notes</b>   | 84  | <b>24-bit Display Adapter Roundup</b><br>BY GREG LOVERIA                         |
|     | <b>FEATURES</b>   | 97  | <b>Image Doctors</b><br>BY D. BARKER   |
| 27  | <b>Using Windows NT</b> BY JON UDELL<br>How will NT affect you and your environment?          | 104 | <b>Looking Good for Less</b><br>BY MARK SCAPICCHIO                               |
| 33  | <b>Windows Speaks</b> BY TOM YAGER<br>A quick guide to using Windows Multimedia Extensions.   | 113 | <b>Four Windows Desktops</b><br>BY DICK POUNTAIN                                 |
| 45  | <b>How OLE Works</b> BY BARRY NANCE<br>Some sobering experiences with OLE.                    | 119 | <b>Tracking the Elusive Project</b><br>BY DANIEL YAHDV                           |
| 55  | <b>The OS/2 Alternative</b> BY MARK MINASI<br>There is some kind of 32-bit OS in your future. | 172 | Editorial Index by Company   |
| 63  | <b>The Pick of Windows</b> BY HUGH KENNER<br>Windows books for every skill level.             | 169 | Alphabetical Index to Advertisers  |
|     | <b>WINDOWS BUYER'S GUIDE</b>  | 170 | Index to Advertisers<br>by Product Category<br>Inquiry Reply Cards: 96A, 172A    |
| 128 | <b>BYTE's Guide to 128 Top Windows Products</b><br>COMPILED BY JAN FIDERIO                    | 153 | <b>BUYER'S GUIDE</b><br>Mail Order<br>Hardware/Software Showcase<br>Buyer's Mart |

BYTE (ISSN 0360-5280) is published monthly with additional issues in October and November by McGraw-Hill, Inc. U.S. subscriber rate \$29.95 per year. In Canada and Mexico, \$34.95 per year. European surface mail subscriptions \$50, airmail \$70. Non-European subscriptions, \$50 surface mail or \$75 airmail. All foreign subscriptions are payable in U.S. funds that can be drawn on a U.S. bank. Single copies \$3.50 in the U.S., \$4.50 in Canada. Executive, Editorial, Circulation, and Advertising Offices: One Phoenix Mill Lane, Peterborough, NH 03458. Second-class postage paid at Peterborough, NH, and additional mailing offices. Postage paid at Winnipeg, Manitoba. Registration number 9321. Registered for GST as McGraw-Hill, Inc., GST #123075673. Printed in the United States of America. **Postmaster:** Send address changes and fulfillment questions to BYTE Subscriptions, P. O. Box 552, Hightstown, NJ 08520.

**SOME FEAR IT.  
ALL RESPECT IT.**



**WE BUILD IT.**

**HAMMM**



# ER HEAD

## THE PERFECT PRINTING MACHINE.

QMS has just released a serious predator into the sea of ordinary printers. The QMS® 860 Hammerhead™ printer is the first to feed on a Canon® LBP®- BX engine to give you true 600x600 dpi output in up to 11x17/A3 format. Its 25MHz RISC processor and optional EtherTalk®, NetWare®, or a host of other network support make it sleek, fast, and capable. It has everything you've asked for in a desktop printer—high resolution, PostScript® Level 1 and 2 compatibility, HP PCL® and HP-GL® emulation, and up to 11x17/A3. It's fast, compact, compatible with all major platforms, and so affordable that it's causing a frenzy among the competition. The QMS 860 Hammerhead is the perfect printing machine. Get it. Call **1 800 422-2769 ext. 2997** or **205 639-4400** for your nearest QMS dealer.

**True 600x600 dpi • 11x17/A3 • \$4595\***



QMS, the QMS logo, and Hammerhead are trademarks or registered trademarks of QMS, Inc. PostScript of Adobe Systems Inc. All other product and company names are trademarks or registered trademarks of their respective companies. \* Suggested retail price, US.

**Circle 101 on Inquiry Card (RESELLERS: 102).**

# BYTE Focuses on Windows

No, BYTE has not gone Windows-specific. We are still the world's leading authority on multiplatform computing, and it's for this reason that we are bringing you this Essential Guide to Windows.

In this special issue, you'll get the usual in-depth BYTE features on topics including NT, multimedia, OLE, and OS/2. We also feature our well-known literary critic, Hugh Kenner, with a timely review of 15 Windows books. And you'll find reviews of important new products, in addition to a bonus buyer's guide to 128 Windows applications. We've pulled to-

gether the most essential information for you on this leading operating system so that you can make your own choice—or, if you are already a Windows user, so you can use it to its full advantage.

Why Windows? Look, for example, at our News & Notes on page 12: The numbers speak for themselves. Windows has permeated every corner of the computer market and has changed the face of computing forever. And Microsoft is continuing to build on its DOS/Windows foundation with a new object-oriented version in the works and the networking capabilities coming with NT and Windows for Workgroups.

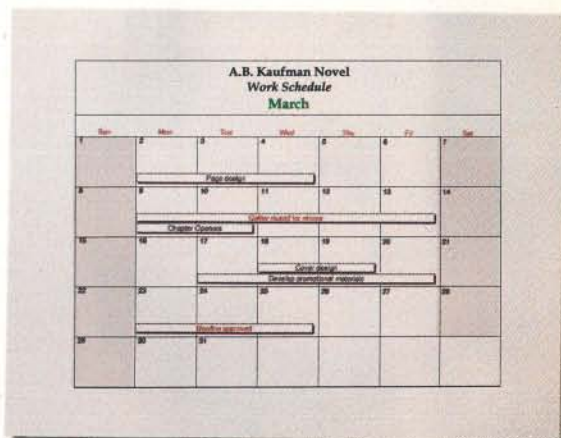
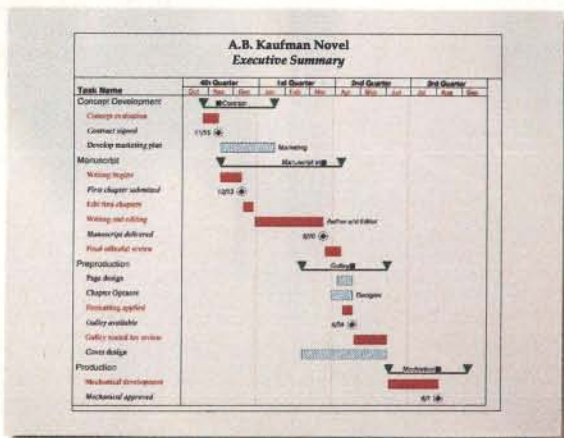
Long ago, someone at Microsoft had the idea that Windows could someday rival the Mac OS as a GUI. Now that vision is seeping into all aspects of the industry.

Microsoft is now credited for its software vision, but this was not always the case. As recently as 1989, industry analysts criticized Windows for being clumsy and slow. Many, including IBM, saw it as a mere stepping stone to OS/2 with Presentation Manager. Few doubted the continued predominance of DOS software giants like Lotus, WordPerfect, and Software Publishing, and almost no one imagined that the little DOS shell from Redmond, Washington, would contribute to a fundamental redefinition of operating systems.

Two and a half years after the introduction of Windows 3.0, no one doubts its impact. More than any other factor, Windows was responsible for the historic split between Microsoft and IBM. Now, as IBM struggles to make OS/2 2.0 a viable contender, Microsoft is preparing to ship its own 32-bit operating system, NT. The battle of the operating systems is far from over, but NT, of course, still not a shipping product, has already elicited an unprecedented amount of interest.

## The CEO wants to know when it will be finished.

## The staff wants to know when they can start.



As a project manager, you've seen it all before. Everyone who needs to know, all too often, needs to know something different. Which is why there's new Microsoft Project version 3.0 for Windows.

It not only makes it easy to present

things the way *they* want, but also lets you plan things the way *you* want.

Now you can enter and view data in a variety of ways—Gantt's, tables, graphs, forms and more. Microsoft Project also has a customizable Toolbar, giving you access

## On a Roll

Windows has shifted the balance of power among software vendors and put Microsoft on a roll. Its Excel, Word, and PowerPoint applications have wrested market share from Lotus, WordPerfect, and Software Publishing. Microsoft's Access, FoxPro, and SQL Server database tools target Borland and Oracle. And with the upcoming NT providing networking capabilities, Microsoft will be redoubling its efforts to compete with Novell.

Of course, in addition to Microsoft, almost every software development company is jumping on the Windows bandwagon. The latest report from the Software Publishers Association shows the dollar value of the North American Windows software market in the first half of 1992 at \$857 million, a rise of more than 141 percent over the first half of 1991. By comparison, DOS programs fell 8.7 percent to \$1.3 billion, and Mac programs rose 32 percent to \$490 million. SPA research director David Tremblay expected Windows software sales to top those of DOS for the first time in the third quarter of this year.

The impact on PC hardware has been equally great. Windows has dramatically

changed the baseline system configuration: Whereas a 286 with 1 MB of memory and a 20-MB hard drive was once ample for most users, now a 386-class machine with 4 MB of RAM and a 60-MB drive barely suffices. Analysts expect that 50 percent of new systems will go out the door this year bundled with Windows. An increasing number of systems will also incorporate technologies (e.g., graphics accelerator boards and local bus video) that help meet Windows' performance demands.

In the long run, Windows' most significant impact will be on the very definition of an operating system. Windows is more than a GUI: It controls the screen, supplies drivers for devices ranging from printers to video recorders, and provides a mechanism for user-defined interapplication communication.

These capabilities are not unique; the Mac has long implemented many of them and continues to provide the most seamless GUI implementation. But the Mac OS runs on only one system (that may change if Apple and IBM deliver PowerOpen as promised). According to Microsoft, Windows will soon run on top of both DOS and NT, and the company plans to imple-

ment NT for Intel, Mips, and DEC Alpha processors. Windows may become a vehicle for heterogeneous computing.

## Multiplatform Standard?

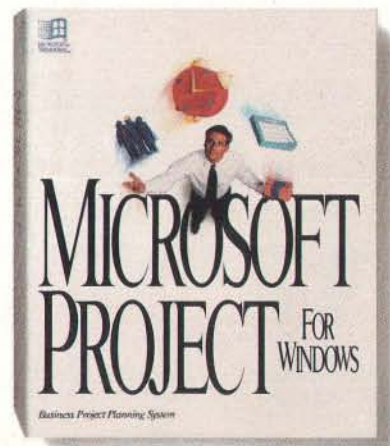
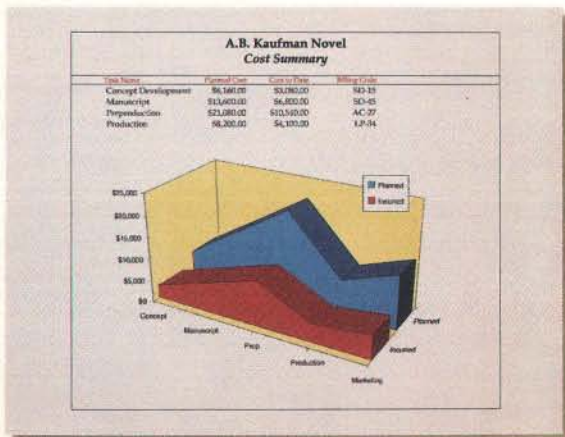
Microsoft may not have planned to port Windows to so many platforms when it was developing version 3.0, but with this change in direction, the nature of future operating systems has become clear. The user interface and the programming interface will remain constant across different platforms, and the operating-system kernel will take responsibility for making the hardware invisible to the user.

Although we concentrate this issue on Windows, we are not thinking for a minute that it's the only solution. More than 10 million copies reportedly have been sold, but even Microsoft admits that perhaps only 30 percent of those are in use. That puts the Windows user base at about half that of the Mac and less than one-tenth that of DOS.

Keep reading BYTE for our coverage of all these platforms. And stay tuned for more exciting *Essential Guides*, in which we will provide you with all you need to know about multiplatform computing.

# The controller wants to know how much it will cost.

# We want to know what you're waiting for.



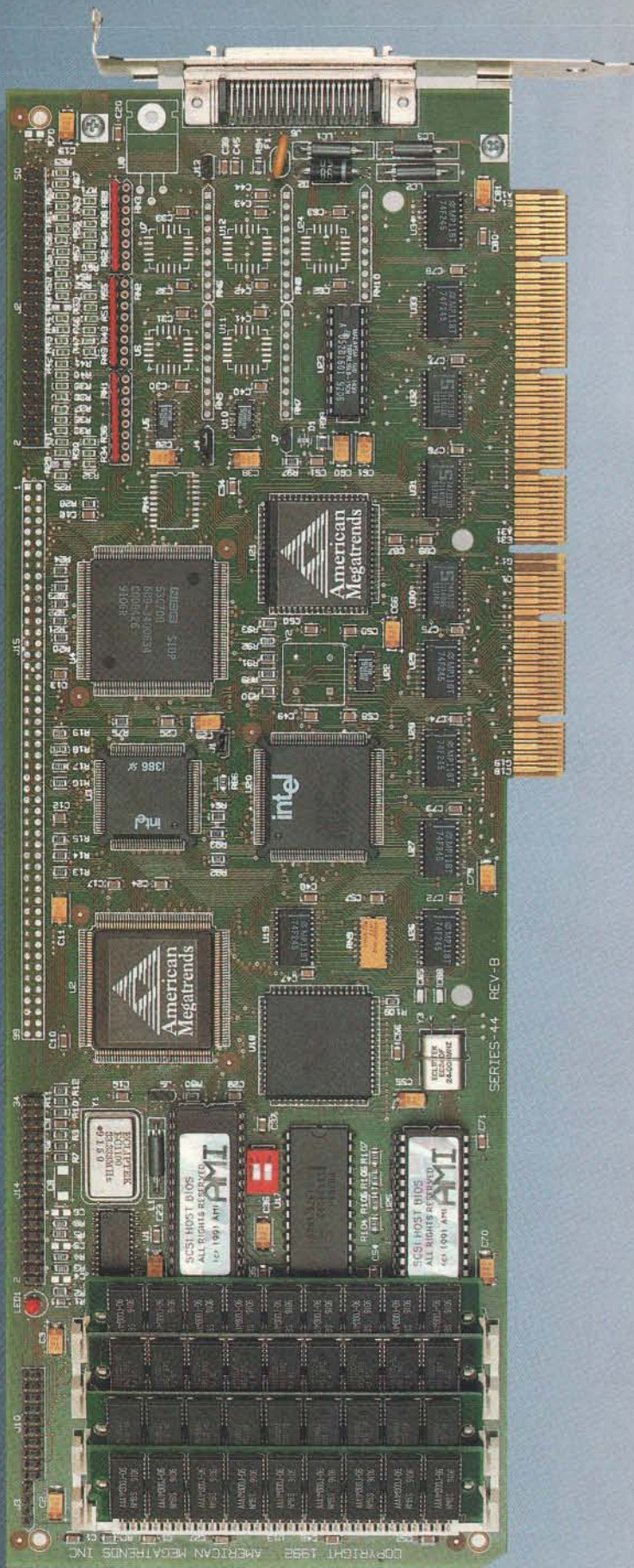
to the functions you use most with a click of the mouse. While PlanningWizards give you online assistance to help develop plans.

What's more, new Microsoft Project has WYSIWYG and Multi-Page Print Preview, so plan on visiting the printer less.

For your upgrade or the name of a reseller, call (800) 541-1261, Dept. X13. You'll satisfy a lot more people. Including yourself.

**Microsoft**  
Making it easier





# EISA SCSI Caching

How do you move volumes of data from your SCSI device fast and efficiently? With the Fast Disk EISA SCSI Caching Host Adapter from American Megatrends.

## THE SUPERIOR PERFORMANCE SOLUTION

The Fast Disk SCSI controller supplies the industry's highest transfer rates and uses a 386SX CPU to manage up to 16MB of cache.

"...superlative disk performance - the best seen by PC Labs thus far - thanks to AMI's Fast Disk Controller, a 32-bit SCSI EISA card with a 386SX/16 microprocessor and 16MB cache." *PC Magazine - June 16, 1992*

## UNBEATABLE COMPATIBILITY

The Fast Disk SCSI Host Adapter is compatible with the popular Adaptec 154X and BusLogic drivers, and supports a wide assortment of SCSI devices, including hard drive, tape, CD-ROM and WORM.

## FROM THE LEADING EISA DEVELOPERS

As the leading developer of EISA motherboards and EISA BIOS, American Megatrends has the knowledge and resources to support your EISA applications. With over 150 combined years of EISA/SCSI design experience and the only company with both board and BIOS design knowledge, you are ensured compatible designs that work.

For full information on America's premium EISA peripheral cards, call American Megatrends today and see why more people move more data with AMI.

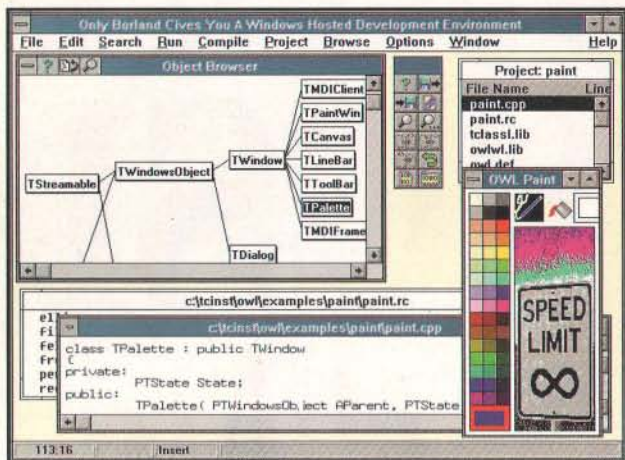
AMERICAN MEGATRENDS, INC.  
6145-F NORTHBELT PARKWAY  
NORCROSS, GA 30071  
(404) 263-8181, FAX (404) 263-9381  
(800) 828-9264, (800) U-BUY-AMI  
IN SINGAPORE (65) 294-6714  
IN THE U.K. (0293) 536-365



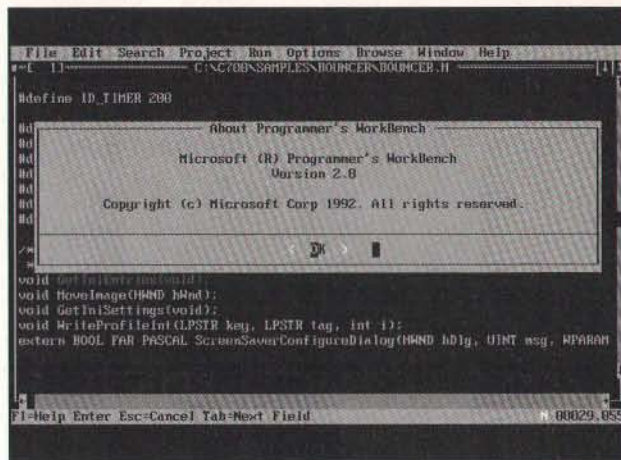
Distributed by **MERISEL** (800) MERISEL

Circle 69 on Inquiry Card (RESELLERS: 70).

# BORLAND C++ DOES



VS.



**Borland C++ & Application Frameworks**  
Streamline your development cycle by creating Windows applications within the graphical Windows environment.

Trying to write a Windows application in character-mode DOS is like working with one hand tied behind your back. With Borland® C++ you get a complete Windows Integrated Development Environment (IDE), as well as a DOS IDE. Your development cycle is streamlined because you can create, edit, optimize and run your Windows applications all from within a graphical Windows environment.

You'll love the convenience and power of the IDE with its special features like the ObjectBrowser™ to show you class relationships and help you navigate through your code, and the special SpeedBar™ for instant access to commonly used functions.

## Integrated Resource Workshop VS. disintegrated SDK

Because Borland's Resource Workshop is fully integrated, you can create Windows resources quickly and easily. You just "draw" great-looking Windows resources like dialog boxes, buttons, icons and more. It's infinitely simpler than wrestling with the SDK. And you get Borland's own Custom Controls for slick new resources with the look of chiseled steel.

## Write less code VS. write more code

Borland's application frameworks let you "bolt on" a complete user interface in a snap. Our ObjectWindows™ high-level objects give you graphical user interfaces with far less code than

the low-level Microsoft® Foundation Classes. And Turbo Vision™ gives you great ready-to-plug-in user interfaces in character mode for DOS. Both dramatically reduce the code you need to write.

## Powerful tools VS. wimpy tools

Borland C++ gives you a complete selection of the finest tools. Turbo Debugger® for Windows and DOS, Turbo Profiler™ to pinpoint bottlenecks in your code, object-oriented Turbo Assembler,® WinSight™ to monitor Windows activity, Winspector (the UAE tracing utility) and more than 4,500 pages of clear, comprehensive documentation.

**Supports Windows 3.1** And Borland C++ supports all the advanced features of Windows including multimedia, Pen, OLE, TrueType, DDEML, CommDiag, and other Windows features. If Windows has it, Borland supports it.

## Full C++ VS. partial implementation

Full language compliance is key in a compiler and only Borland complies with AT&T's CFRONT 3.0 C++ standard. Only Borland gives you templates to reduce the amount of code that you need to write.



January 1992  
Borland C++



March 23, 1992  
Borland C++



December 23/30,  
1991 Borland C++



June 10, 1991  
Borland C++

## Microsoft C/C++

Why write a Windows application using character-mode DOS?  
*It doesn't make sense.*

## Third-generation VS. first attempt

Borland's third-generation C/C++ compiler brings you the power and reliability that only comes with experience. Borland gives you a faster C/C++ compiler with great features like a smart project manager and automatic, safe precompiled headers. Just some of the many reasons why we've sold over 700,000 C/C++ development systems to professionals worldwide.

## Go with the best

The best C and C++ tools for Windows are from the leader in Object-Oriented Programming. Trust your code to Borland.

## Special Limited Time Offer

We're so convinced that you'll prefer Borland that we'll give Borland C++ & Application Frameworks **FREE** to the first 1,000 people from whom we receive a Microsoft C/C++ disk and a letter stating *why Microsoft doesn't work for them*. For details:

**Call 1-800-331-0877,  
ext. 5375**  
In Canada call 1-800-461-3327

**BORLAND**  
*The Leader in Object-Oriented Programming*

# WINDOWS BETTER

BORLAND® C++ & APPLICATION FRAMEWORKS

**FREE!**  
see coupon for details.

**B O R L A N D**

*The Leader in Object-Oriented Programming*

Circle 76 on Inquiry Card (RESELLERS: 77).

## WINDOWS WILL DOMINATE, PREDICT ANALYSTS, BYTE READERS

The Redmond Group is bullish on Windows and bearish on OS/2 and Unix. The consulting firm forecasts that OS/2's best year of market share will be 1992, while Unix will top out in 1993. Note that The Redmond Group predicts that, as late as 1997, DOS will still be the basis for more than half of new operating-system shipments.

Analysts predict a rosy future for Microsoft Windows for both DOS and the Windows NT operating system. A report by The Redmond Group, a consulting firm in Redmond, Washington, projects that by 1997, the two versions of Windows will together command 83 percent of new operating-system shipments, compared to less than 2 percent for Unix. Of the Windows units that will be shipped in 1997, 61 percent are expected to be for DOS, and the balance for NT.

Respondents to the semiannual BYTE trade-show poll on the future of operating systems—who may be less bullish by nature than analysts—take a slightly more conservative view. Of these, 47 percent predict that DOS extended with Windows will be the dominant oper-

ating system in 1997. When you toss in the 17 percent who predict that NT will dominate, it adds up to a comfortable majority for Windows-based platforms. Poll respondents are more optimistic about the chances for OS/2 and Unix than many analysts are, awarding the 32-bit operating systems 16 and 7 percent of the vote, respectively.

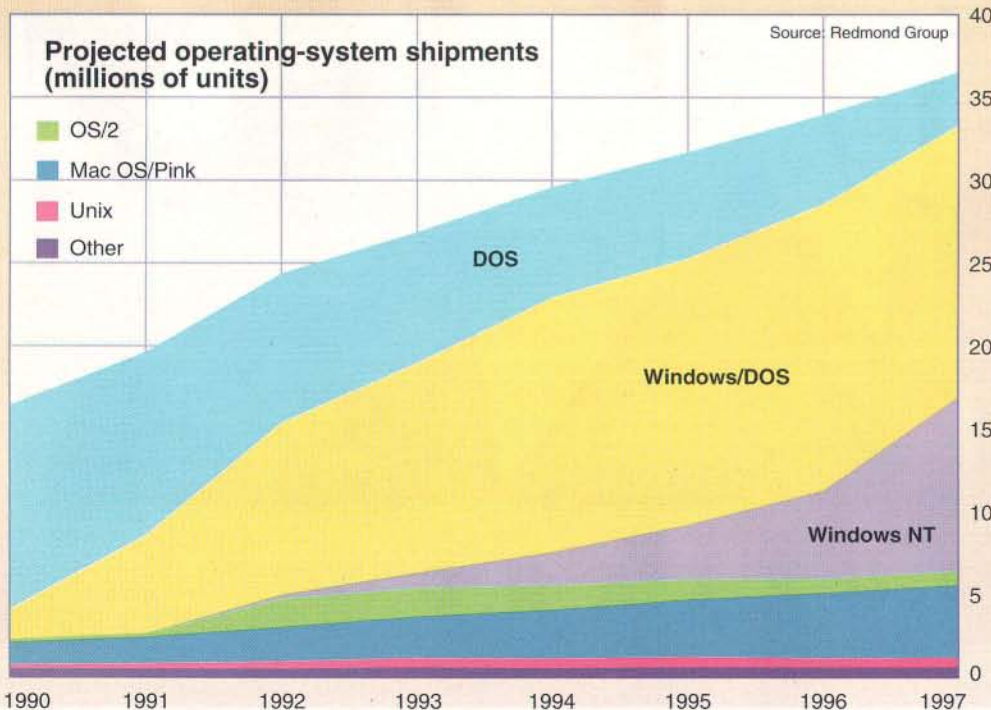
Another way to measure the market strength of various platforms is by the number of applications expected to be available for each. Forrester Research projects that the number of Windows applications will double between now and 1995, from 5000 to 10,000. OS/2 applications will grow at a faster rate but are projected to total only 3000 in 1995. Macintosh programs will rise from 4000 to 5000.

## WINDOWS PROGRAMS PRICES PLUMMET

Are prices softening for Windows software packages? The decline is not as significant as the plummet in hardware pricing, but as vendors race to gain market share in the Windows segment, they are forging aggressive deals with large customers. Says **Jeffrey Tarter**, editor of *Soft•Letter*: "The dynamics are clear: As soon as Lotus and WordPerfect came out, Microsoft reacted by slashing prices, specifically to high-volume accounts." The result, he says, has been deals of less than \$100 for Excel and Word for Windows to customers who buy Microsoft's whole Windows suite.

Tarter cautions that this is only a "specific softening of prices," not a permanent collapse. "When my supermarket runs a special on tomatoes," he says, "that doesn't mean a fundamental change is occurring in food prices." Sooner or later, Tarter believes, Microsoft will have to raise prices; otherwise, it won't make enough profit. And, he says, there hasn't been a major softening in retail street prices for top programs.

Dataquest analyst Bill Kesselring takes a slightly different view. He has measured a decline in retail prices for Windows applications of about 6 percent over the last six months, and he projects that the figures will fall another 10 percent next year. But Kesselring points out that the decrease has been mostly at the retail, not wholesale, level and is attributable to fierce competition in that sector. While users enjoy the savings, resellers are taking a big hit on margins. □





## CAIRO IN MICROSOFT'S FUTURE

Windows NT may have grabbed the spotlight among 32-bit operating systems, but in the mid-1990s Microsoft will face new competition from object-oriented operating systems such as IBM/Apple Taligent and the rumored Spring project at Sun. To respond to these perceived challenges before they even arrive, Microsoft is now outlining a program to add object orientation to Windows by 1994.

At the Windows NT Developers Conference in San Francisco last July, and again a few weeks later at the ObjectWorld conference in San Francisco, Microsoft previewed an object-oriented future version of Windows, code-named Cairo, that it expects to beta-test in 1993 and ship in 1994. Unlike object-oriented systems that start from scratch, Cairo will build on the existing DOS and NT kernels and the Windows GUI and API. Skeptics charge that this hybrid ancestry will constrain Cairo's object orientation, but Microsoft replies that its design permits security, scalability, distribution, and migration from today's programs—all features it says an object-oriented system must supply.

Cairo will consist largely of a layer of software services nestled between the operating-system kernel and the Windows API. Many of the basic mechanisms for Cairo are already in place. It builds on Microsoft's OLE protocol, extending OLE's model for communication among appli-

cations to span systems and networks. It will also take advantage of the object orientation now written into the NT kernel, which implements a consistent model for passing objects between processes, whether on one machine or across a network.

What's the benefit of an object-oriented operating system? In the short term, object orientation will help developers create applications faster and better because code can be more easily reused. This should lead to more innovative applications. For users, object orientation will permit greater flexibility in how programs are put together and used.

In addition, Cairo promises to free developers and users from dealing with inconsistent data types and interface models. In other words, users will be able to concentrate on their work, not on tracking down and translating data. □

### Cairo's Main Features

- Object-oriented file system
- Builds on MS-DOS and Windows NT kernels
- Uses Windows GUI and API
- OLE over networks

## WILL WINDOWS BE THE CHOICE FOR HAND-HELD COMPUTERS?

Whether you call them personal communicators, palm-tops, or PDAs (Personal Digital Assistants), tiny portable systems are the latest vogue among computer makers. But like the shift from hosts to client-server PC LANs or from character-mode DOS to Windows, the move to hand-held PCs could alter the power balance among industry players. In particular, it could loosen the virtual stranglehold that Microsoft now has on the mass market for operating systems.

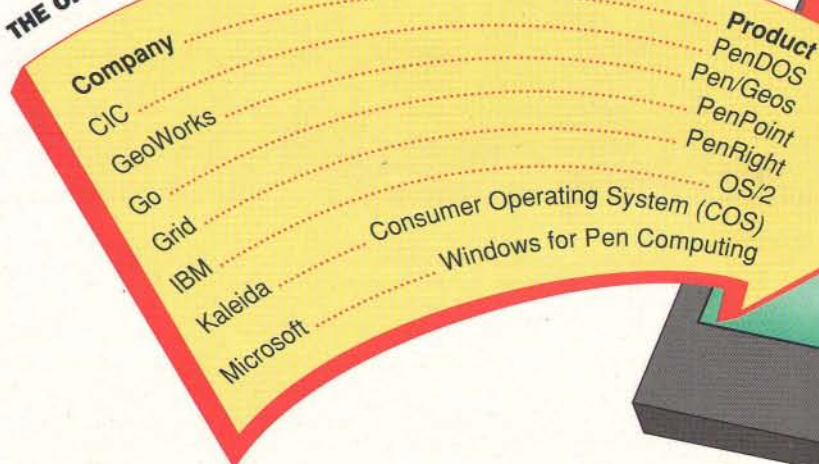
Will Windows and DOS remain preeminent when (and if) the user community shifts from traditional notebooks and desk-bound PCs to pocket-size devices? The competition is heating up: Although Microsoft is shipping a version of Windows with extensions for handwriting recognition and pen input, called Windows for Pen Computing, players such as Go Corp., Grid, Computer Intelligence Corp., IBM, Apple, GeoWorks, and Kaleida are mov-

ing aggressively to stake out their own turf in the hand-held market.

Go Corp. is shipping its non-DOS PenPoint operating system and has signed up an impressive list of OEMs, including IBM, that plan to use the software in pen-based computers. The roster of third-party software providers committed to PenPoint contains few household names but many innovative and well-funded start-ups.

Grid and CIC are taking a more conservative tack, selling pen-based software environments (PenRight and PenDOS, respectively) that build on DOS but don't use the Windows API. The advantage of these products is that they can run on simple, low-cost 8088-/8086-based systems, whereas both PenPoint and Windows for Pen Computing require 386s with ample RAM. Not only are 386 systems larger and more expensive, but they also use more power. If the market for pen systems stays focused on specialized vertical applications

### THE OPERATING SYSTEM BATTLE SHIFTS TO HAND-HELD COMPUTERS

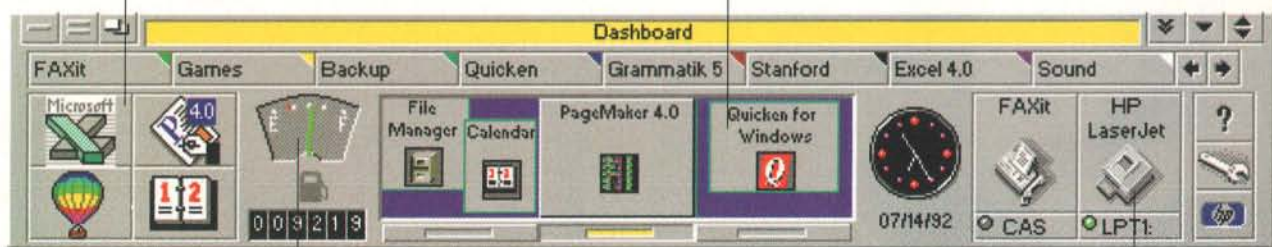




# INTRO THE FAST WORK IN

*Quick launch your favorite applications, with the touch of a button. Just aim and click.*

*Instantly change your workspace with up to 9 full-screen views (virtual screens). It's like working on 9 computers at once!*



Actual Size

*Monitor and control your memory and system resources at a glance.*

*Drag and drop documents to the printer icon. Reconfigure or set default with a click.*

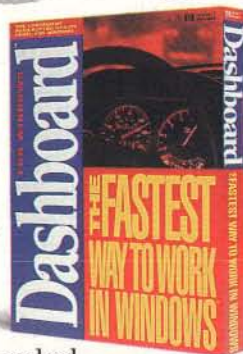


# INTRODUCING THE FASTEST WAY TO WORK IN WINDOWS™

It's a new Windows speed record. A quick collection of fast-forward buttons, neatly organized in a convenient push-button utility panel that makes working in Windows faster than ever. Introducing Dashboard™. The fastest way to work in Microsoft Windows.®

Dashboard turns slow, complicated Windows operations into single-stroke sprints. Zip into your favorite applications with a click.

Switch between different full-screen views of applications in one step. Instantly change the printer default, or drag and drop documents to print... never has so much mobility and convenience been packed into so little screen and disk space. Everything, including a clock with alarms and a "fuel" gauge to check your computer's memory usage,



is at your fingertips. And lightning fast.

So if speed is what you need, get the fastest way to work in Windows. Get Dashboard. With push-button power like this, who knows?

You might set a few speed records of your own.

See your dealer or call 1-800-554-1305 Ext. 800B.

**FOR WINDOWS™**  
**Dashboard**  
The Fastest Way To Work In Windows™

and eventually migrates to the price-sensitive consumer sector, reduced hardware requirements could prove to be a vital asset.

At the other end of the spectrum, IBM is reportedly working on pen extensions to OS/2's Presentation Manager, with an eye to scaling down the operating system to work on hand-held computers. It seems a rather unlikely combination, but by the time IBM has the job done, 32-bit hand-held systems with huge amounts of RAM may be feasible.

Apple's approach is even more radical. The **Newton** hand-held system, being codeveloped with Sharp and expected in early 1993, will use both a new CPU—the ARM RISC chip—and a new operating system dubbed **Newton OS**. Apple is thus forgoing compatibility not only with the DOS/Intel standard but also with its own Macintosh line. That it is willing to do so indicates how distinct Apple believes the market will be for hand-held systems.

Apple is also indirectly involved in yet another consumer computer initiative: the **Kaleida** multimedia software joint venture with IBM. Kaleida has said that it is working on a so-called **Consumer Operating System**, or **COS**, that will run on several brands of PDAs. Along with **COS**, Kaleida is creating a language called **Script X**; programs written in it will be able to execute on Macintosh, Windows, OS/2, and Unix platforms.

Another company betting on the possibility that hand-held systems may not be based on

Intel chips is **Go Corp.**, which announced in July that it will port **PenPoint** to AT&T's new **Hobbit RISC** processor. The **Hobbit** is designed specifically for personal communicators and includes built-in voice, fax, and data communications features. "We chose **PenPoint** be-

cause it is written from the ground up for the pen," said **Rob Franzo**, a member of the technical staff at AT&T's microprocessor architecture group.

Microsoft's response to the competing developments is multifaceted, according to **Pra-**

**deep Singh**, group product manager for Windows for Pen Computing. First, the company is creating a version of **Windows 3.1** that system makers can build into ROM. By putting **Windows** in silicon, vendors can boost performance and save disk space—an important attribute for systems that may not even include a disk drive. **ROM Windows** will still require a 386 processor, but its major selling point will be **Windows'** desktop heritage.

Microsoft is also continuing development of **Windows** for Pen Computing, with an eye to bringing out mobile solutions compatible with desktop applications. **Singh's** group is addressing features such as deferred communications, better handwriting recognition, improved connectivity to host systems, drivers for **PCMCIA** cards, and, through participation in the **Portable Computing Initiative**, power management.

Another project at Microsoft is focused specifically on solutions for the hand-held market. **Singh** says this project's

group is less concerned about staying compatible with Microsoft's desktop offerings. "The big difference between the two groups is that the user model—how the user interacts with the application—is different," he says. "This implies that the nature of the operating system is different." For that reason, he adds, "it's unlikely that [desktop **Windows**] apps will run unmodified on the **PDA**."

A common theme among vendors of both hardware and software is that the new category of pocket computers rep-

resents a once-in-a-decade opportunity: the chance to level the playing field after years in which power has increasingly flowed to Microsoft and Intel. Faced with increased competition and eroding profits on their traditional desktop and laptop offerings, companies are now looking at pen and pocket computing as the growth engine for the next decade. The key question is whether users of pen-based hand-held computers will be drawn from the same group of users who are now pounding on desktop keyboards. □



## PEOPLE ARE TALKING



**"The only thing object-oriented about OLE today is its name."**

—Philippe Kahn,  
chair and CEO,  
Borland International

**"I hate the way the word 'object' is being used in the industry. It's an internal technology, not a market opportunity."**

—Bill Gates, chair and CEO, Microsoft

**"Within three years, televisions will have either a Windows or Mac interface."**

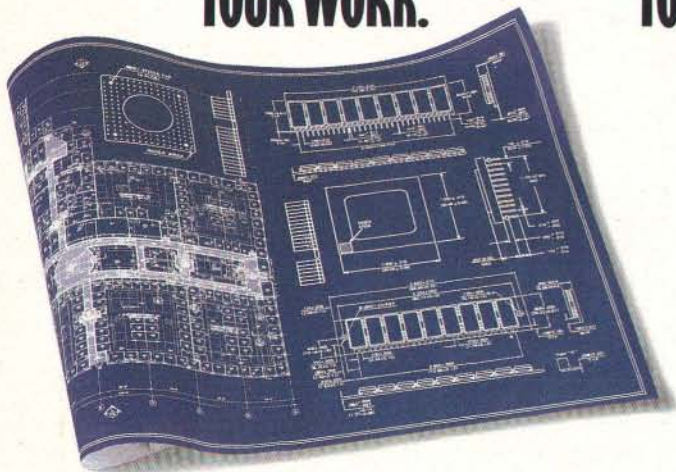
—Nolan Bushnell,  
chair, Octus



New  
For Windows  
3.1!

# WHICH IS THE BIGGER PROJECT?

**YOUR WORK.**



**YOUR PROJECT MANAGEMENT SOFTWARE.**



**New Time Line  
for Windows. Because using  
your project management  
software shouldn't be a  
project in itself.**

If the software that you've tried has been long on promises and just short of impossible to use, you haven't

seen Time Line® for Windows. A new version of the industry standard designed to be easy to learn and responsive to your needs.

**TIME  
LINE**

**FOR WINDOWS**  
Once again, Symantec sets the standard for project management.

**So usable,  
you'll actually use it.**

If you can make an outline, use a spreadsheet and a mouse, you can have printed reports in under

an hour. Just point, click, and drag to arrange your schedule.

You won't go it alone. Co-Pilot™, our on-board logic, prompts you through the process.



To stretch tasks, re-prioritize activities or set dependencies, just point and click.

concise reporting is

critical to keeping projects on track, you'll get a variety of flexible tools to help you design custom reports.

### **Real power made easy.**

We became the standard for our powerful, yet accessible tools, includ-



Flexible reporting options, such as Calendar Report™, make it easy to get what you need in the format you need it in.

ing true effort-driven scheduling, resource leveling, and schedule consolidation. And because clear,

So, if your project management software isn't working for you, call **1-800-228-4122, ext 328-Y** for more information or a demo disk. Or see your dealer.

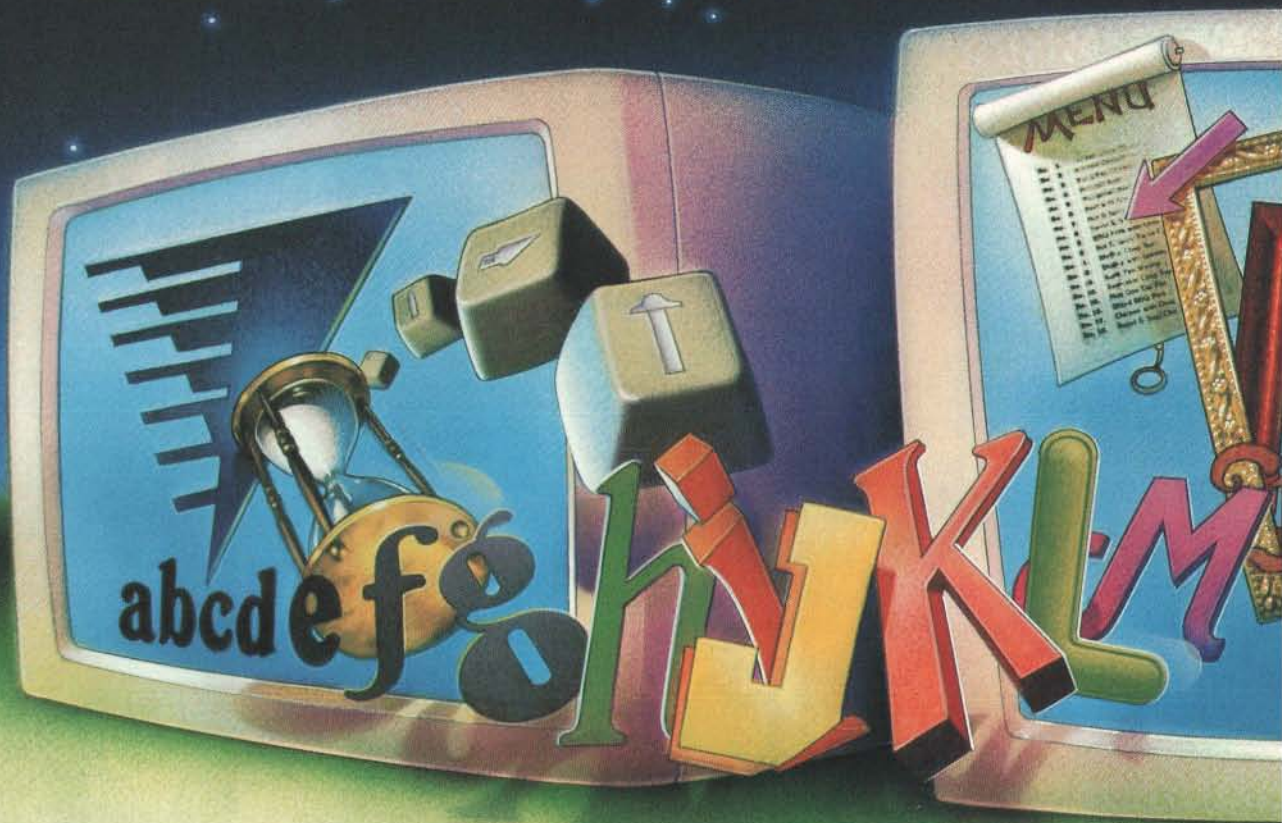
**Ask about our competitive upgrade—just \$199\* (a \$699 value).**



**SYMANTEC.**

\*This offer valid in the U.S. and Canada only. © 1992 Symantec Corporation. For more information in Europe, call 31-71-353111. In Australia, call 612-879-8577. Everywhere else outside U.S., call 408-252-3570. Time Line is a registered trademark of Symantec Corporation. Co-Pilot and Calendar Report are trademarks of Symantec Corporation. All other products are trademarks or registered trademarks of their respective holders.

# ANNOUNCING THE POWER TO VENTURA PUBLISHER



Power. That's what it takes to do real document publishing. New Ventura Publisher® 4.1 for Windows gives you the power and the tools to publish like never before.

In fact, Ventura Publisher 4.1 for Windows has a totally new look—plus advanced-productivity extras to deliver even more publishing precision and automation.



For starters, now you can access any of Ventura Publisher's high-performance features at the click of a button. Customize the buttonbars, zoom sizes, tool palettes, and more.

Take frame tags. Ventura originated the power of paragraph tags. Ventura Publisher 4.1 expands that power with frame tags—so you can automatically create, revise, and repeat entire frame formats and attributes.

Take interactive tab editing. It lets you select



# OL FOR DOCUMENT MAKERS. 4.1 FOR WINDOWS.



tabs, margins, and indents by simply clicking the mouse on the ruler.

And Ventura Scan™ and Ventura Separator™ are now included. Install these programs when you want to add sophisticated image scanning and color separat-

ing without ever leaving Ventura Publisher.

If you're looking for power publishing, look into new Ventura

Publisher 4.1 for Windows.

See your local Ventura dealer. Or call (800) 822-8221. Then get ready for the kind of document making capability

Windows has been waiting for.

Ventura Publisher 4.1 for Windows.

The Document Maker.



Frame Tags	↓
Default	↑
<No Tag>	
1 pt. Border	
2 pt. Border	
No Border	
Pic Frame	
3 Column Text	
2 Column Text	
50 % Gray	
50 % Red	↓

**Ventura Software Inc.**  
A Xerox Company

15175 Innovation Drive, San Diego, CA 92128 • (800) 822-8221

© 1992 by Ventura Software Inc. All rights reserved.

Circle 133 on Inquiry Card (RESELLERS: 134).

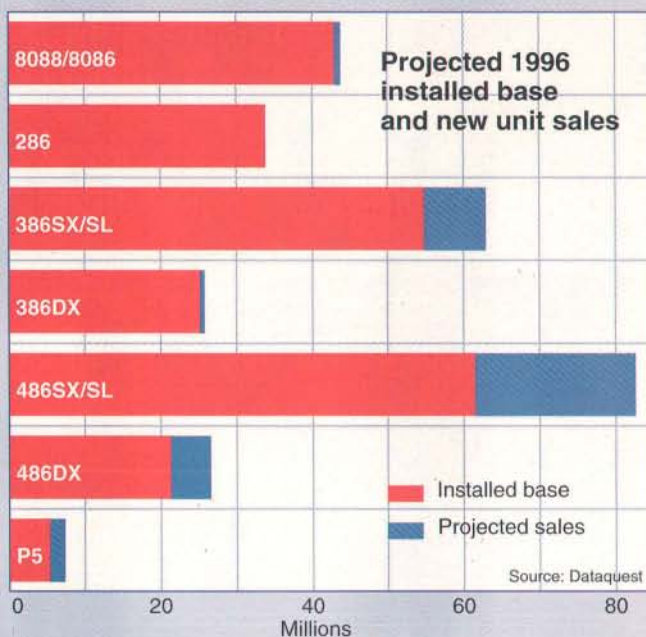
## WINDOWS SELLS HARDWARE

Only a few years ago, a standard desktop system typically included a 286 or 386 processor, 1 MB of RAM, a 20-MB hard drive, and 640- by 480-pixel VGA graphics. While the trend lines had already projected an inexorable shift toward more powerful processors and systems configured with more RAM and larger drives, the market acceptance of Windows has hastened this process. At the same time, it has created a need for graphics accelerators.

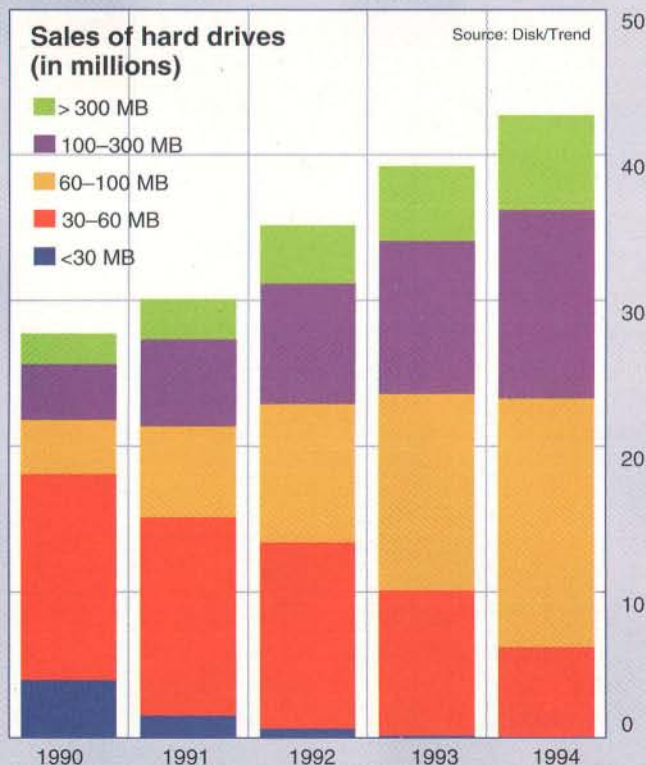
With the growth of 32-bit operating systems such as OS/2 and Windows NT, demand will solidify for 32-bit processors and virtually disappear for 8- and 16-bit machines, says market researcher Dataquest. The only exception will be a small demand for 8088/8086 chips in hand-held systems (see figure 1). Dataquest doesn't see Intel's pending P5 chip gaining a significant share through 1996.

The amount of mass storage space that users need has always grown over time, but "Windows has accelerated the move to higher-capacity rigid drives," says Bob Katzive, a vice president at storage researcher Disk/Trend. With programs now routinely taking more than 10 MB of space each, drives smaller than 60 MB simply aren't large enough to satisfy customers. Disk/Trend forecasts that sub-30-MB drives will effectively disappear next year, while drives in the 30- to 60-MB range will be on their way out by 1994 (see figure 2). Drives with capacities between 60 and 300 MB will constitute 70 percent of the market in 1994, Disk/

*continued*



**Figure 1:** By 1996, says Dataquest, systems based on 486SX/SL-class processors will have the largest unit sales and highest installed base among Intel compatibles. Sales of 286-class machines will be zero, and 8088/8086 and 386DX systems will barely break the surface. The 386SX/SL-class systems will be in second place, the 486DX will be fading, and the P5 will be only beginning its ascent.



**Figure 2:** Windows and OS/2 are pushing up the demand for larger hard drives as application programs—and the operating environments themselves—get bigger every year. Even more space will be required for imaging and multimedia programs—one reason Disk/Trend projects that by 1994 more than 30 percent of drives sold will have capacities of 100 to 300 MB.



MX17F  
MONITOR  
EDITORS'  
CHOICE  
1992



## VISION GROWS

14" IN 1990. 15" IN 1991. 17" IN 1992.

MAG Innovision wins the Editors' Choice year

after year after year, making us truly the growing monitor company of the nineties. THE LATEST ADDITION TO OUR FAMILY OF winners is the sensational MX17F, whose "sharp image and competitive price make it a compelling choice." So do the MX17F's advanced features. We've combined the latest flat square tube technology with Invar Shadow Mask for distortion-free images and 30% more brightness. Dynamic focus circuitry keeps the whole screen razor-sharp. And non-interlaced resolution — up to

1280 x 1024 — assures the best picture possible. ALL IN ALL, this microprocessor-based, digitally controlled display is perfect for Windows®. Find out more. Contact us at 1-800-827-3998, or 4392 Corporate Center Drive, Los Alamitos, CA 90720. Tel: 714-827-3998. Fax: 714-827-5522.

MX15F  
MONITOR  
EDITORS'  
CHOICE  
1991



PMV  
14VC+  
MONITOR  
EDITORS'  
CHOICE  
1990



© 1992, MAG Innovision. All rights reserved. MAG Innovision and its logo are trademarks of MAG Innovision. Windows is a registered trademark of Microsoft Corp. All other brand and product names are trademarks or registered trademarks of their respective owners.



Circle 144 on Inquiry Card (RESELLERS: 145).

## HOW THINGS CHANGE!

Windows has probably spawned as many prophets as it has users. These quotes from the past illustrate how quickly the market has changed since the pre-Windows 3.0 era.

Trend predicts.

In systems running GUIs, the speed of the graphics display has become a major performance bottleneck. Even a 50-MHz 486 won't run Windows optimally if graphics are being squeezed through a slow bus interface or processed entirely by the CPU. Hence the growing demand for two new performance boosters: local-bus video and graphics accelerator chips.

Local-bus video removes VGA or higher grades of video from the 8-MHz ISA bus and integrates it onto a special bus synchronous with the processor. Both the Video Electronics Standards Association (VESA) and Intel have put forth schemes to standardize the local bus in PCs so that it can be used not only for graphics but also for other peripheral functions that would benefit from higher throughput. Systems incorporating local bus are expected to gain significant market share in the next few years.

Graphics accelerators encode in silicon basic functions such as BitBlt, cursor support, and drawing operations. By processing those functions itself, an accelerator frees up the CPU for other tasks and optimizes graphics performance. □

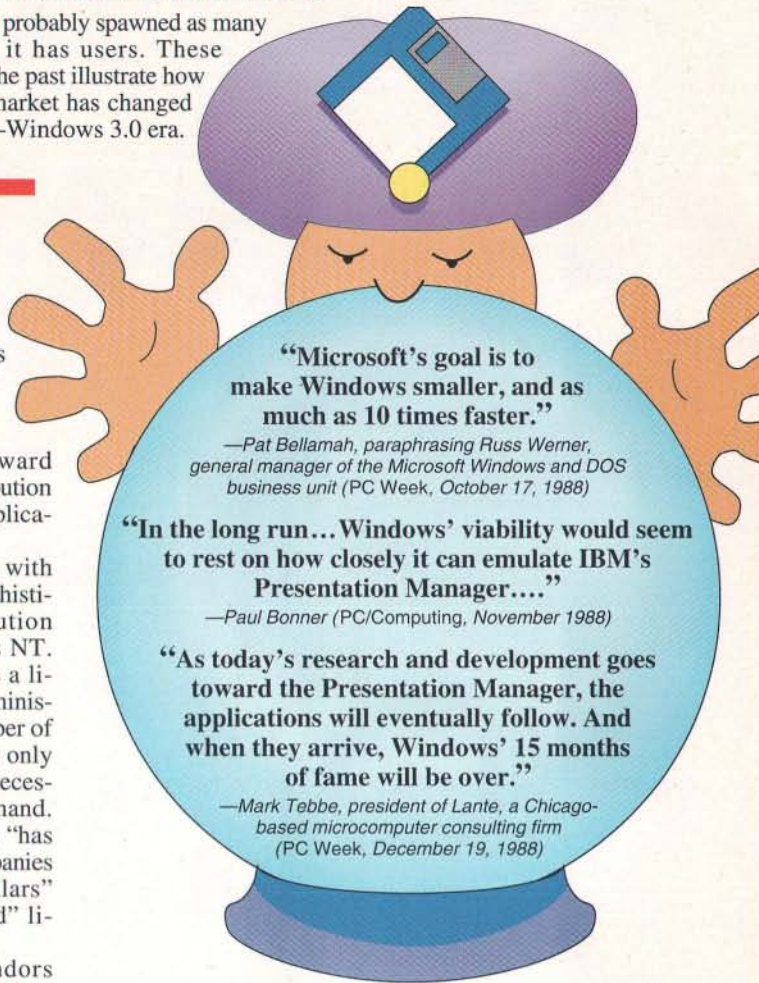
## COMING: SMARTER SOFTWARE

The two most interesting things that are taking place in the Windows arena right now, according to *Windows Watcher* newsletter editor Jesse Berst, are the move toward electronic software distribution and the rise of smart applications.

Microsoft is working with DEC to implement a sophisticated software distribution technique for Windows NT. The system will include a licensing meter so that administrators can track the number of concurrent users and buy only as many licenses as are necessary to meet typical demand. According to Berst, this "has the potential to save companies literally millions of dollars" now wasted on "unused" licenses.

In applications, vendors have shifted away from the features war and toward making their programs smarter about users. The trend, which Berst says started with graphics packages, is now working its way into applications such as Word for Windows. A future release of that package will be much smarter than it is now, he reports.

Berst says that the software will know some syntax and will help to enforce basic rules such as the inclusion of closing quotes and parentheses. It will be a true word processor, rather than simply a character processor. □



**"Microsoft's goal is to make Windows smaller, and as much as 10 times faster."**

—Pat Bellamah, paraphrasing Russ Werner, general manager of the Microsoft Windows and DOS business unit (PC Week, October 17, 1988)

**"In the long run... Windows' viability would seem to rest on how closely it can emulate IBM's Presentation Manager..."**

—Paul Bonner (PC/Computing, November 1988)

**"As today's research and development goes toward the Presentation Manager, the applications will eventually follow. And when they arrive, Windows' 15 months of fame will be over."**

—Mark Tebbe, president of Lante, a Chicago-based microcomputer consulting firm (PC Week, December 19, 1988)

## MISCELLANEA

- Analysts estimate that in 1992, roughly 50 percent of PC-compatible systems will go out the door with Windows pre-installed on their hard drives.
- The Gartner Group assesses the probability that OS/2 will succeed in the market at only 35 percent. If OS/2 fails, The Gartner Group says, not just Microsoft but also Apple will benefit: The Mac will gain 17 percent of new operating-system shipments by 1995, versus 11 percent if OS/2 succeeds.
- Microsoft is reportedly selling about 60 percent of Windows units outside of the U.S.
- Microsoft says it has shipped 3 million units of Windows 3.1, and in most software categories, that would signify a major hit. But according to Jeff Tarter of *Soft•Letter*, the upgrade rate from Windows 3.0 to 3.1 is running at a paltry 10 percent to 15 percent. This may indicate that actual use of Windows is lower than expected.

## WHO'S USING WHAT?

Is there a difference between the profiles of Windows and OS/2 users? John McCarthy, director of computing strategies research for Forrester Research, thinks so.

"OS/2 people are higher-end power users and connectivity users," McCarthy says. "Windows people are mass-market, multipurpose users." OS/2 tends to be concentrated in large IBM accounts, he adds, "but in very few accounts does OS/2 dominate all desktops. Even in the largest OS/2 accounts, you'll find a few people using Windows. The reverse is not true."

Analyst Rikki Kirzner of Dataquest agrees with McCarthy: "The only people buying OS/2 are IBM installed accounts," she says. ■

# How to rise to the top in a sea of details.

NEW!  
PackRat 4.1  
now  
available.

Call for FREE  
demo disk.

## New PackRat™ 4.0 for Windows™ will make them think you walk on water.

If your opportunities are getting bogged down with details, here's help. Let PackRat 4.0 keep track of the details while you focus on the possibilities.

## PackRat works the way you work.

PackRat 4.0 helps you organize information intuitively. Details spring to your screen with a click of the mouse. So you have important information when you need it. Use PackRat to set your priorities and deadlines, maintain names and addresses, remind you when it's time for meetings and phone calls, track to-do's, and much more.

## But don't just take our word for it:

PC Computing praises PackRat as "the ultimate

client contact aid." *InfoWorld* calls it the "strongest" Windows scheduler available. And *PC Magazine* gave it the prestigious "Best of 1990" award, and applauded its "incredible assortment of functions, including a phone book, phone log, calendar, to-do list, index card file, time manager, financial manager, project manager, scratch pad, and more."

## Now you can do more and do it better.

Put PackRat on your management team. For details, please call 1-800-PACKRAT.

**POLARIS**  
SOFTWARE



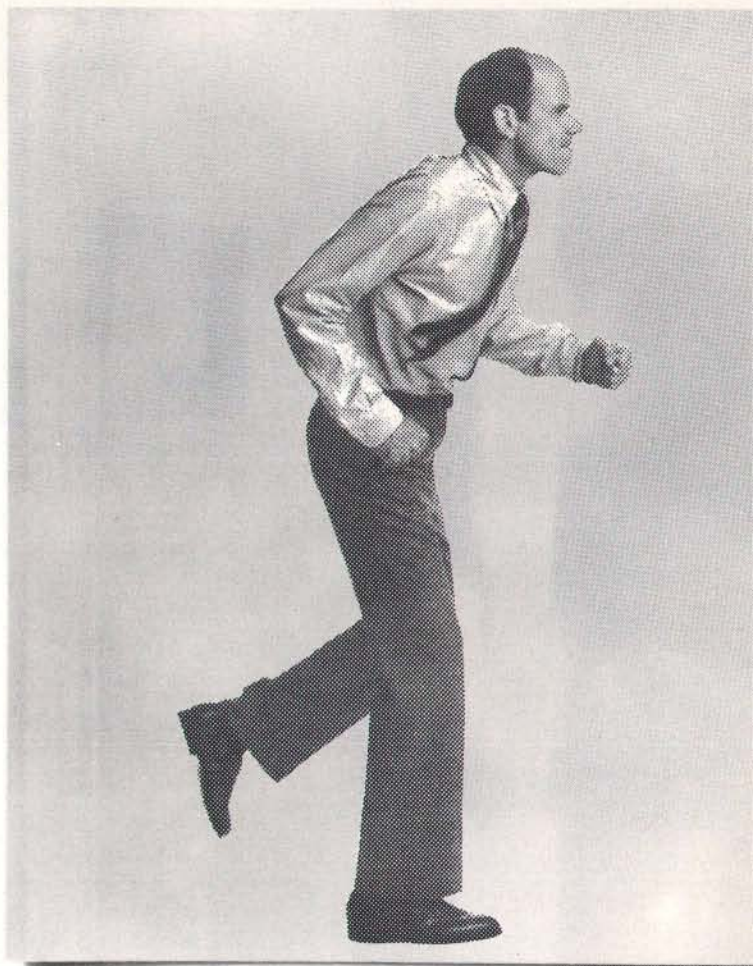
Version 3.0  
Nov. 27, 1990

17150 Via Del Campo, Suite 307, San Diego, CA 92127  
1-800-722-5728/(619) 674-6500

Circle 113 on Inquiry Card (RESELLERS: 114).

# IBM LaserPrinters: The Windows. And

*Most laser printers slow to a walk under Windows.*



Announcing a Windows™ driver designed to leave other printers in the dust: the new IBM® 4029 Print Accelerator for Windows.



If you already own a LaserPrinter 5E, 6, 6P, 10, 10P, or 10L, call 1 800 358-5835 for your free driver upgrade.\*

It's now standard equipment on IBM LaserPrinter Models 5E, 6, 6P, 10, 10P, and 10L, at no extra cost. And it delivers supercharged printing speeds with Windows—for more of the productivity and convenience that Windows is all about.

Now complex graphics and multiple fonts print with surprising speed. You can use both Type 1 and TrueType® fonts. And you get the crisp, 300 dpi output and superb

Application	HP® LaserJet® III with standard Windows driver	IBM LaserPrinter 10 with Print Accelerator for Windows	Speed Increase
Harvard Graphics®	1566 seconds	633 seconds	147%
Aldus® PageMaker®	85 seconds	52 seconds	62%
CoreIDRAW™	126 seconds	96 seconds	31%

*Independent NSTL testing, using complex text-and-graphics documents.*

\*Free upgrade available through 10/18/92. Print Accelerator requires a PC with 386 SX processor or higher and 4MB of RAM. IBM is a registered trademark of International Business Machines Corporation in the U.S. and/or other countries and is used under license. HP and LaserJet are registered trademarks of Hewlett-Packard Company. Harvard Graphics is a registered trademark of Harvard Graphics Corporation.

I B M L A S E R P R I N T

# difference between power Windows.



*With the new Print Accelerator for Windows, IBM LaserPrinters keep you comfortably ahead.*

per handling IBM LaserPrinters  
e famous for.

IBM LaserPrinters come to you  
om Lexmark International, an inde-  
ndent worldwide company, former-  
a division of IBM, that develops,  
manufactures, and markets IBM  
ersonal printers, IBM typewriters,  
ated supplies, and keyboards.



*Up to 150% faster Windows printing,  
on the LaserPrinter 5E, 6, 6P, 10, 10P, and 10L.*

For your nearest dealer, call 1 800 358-5835  
(in Canada, 1 800 663-7662).

And see something truly unique: a laser  
printer that can fly through Windows. And  
look great doing it.

IBM Personal Printers by

**LEXMARK**<sup>™</sup>

**Make Your Mark**

le 96 on Inquiry Card.

ware Publishing Corporation. Aldus and PageMaker are registered trademarks of Aldus Corporation. Lexmark is a trademark of Lexmark International, Inc. TrueType is a trademark of Apple  
mputer, Inc., registered in the U.S. and other countries. Windows is a trademark of Microsoft Corporation. CorelDRAW is a trademark of Corel Systems. © 1992 Lexmark International, Inc.

**E R S . P A G E S A H E A D .**

"Our supervising engineers are demanding, hard to please and pressed for time," explains Mark Richardson, PC coordinator for the Medium Engine Division of Caterpillar, Inc.

Keeping their design projects running smoothly meant finding a drawing program that offered unlimited functionality while also being easy to use.

That's why Mark chose Micrografx Designer.<sup>™</sup>

Designer's advanced power and accuracy allow quick, precise drawing of fuel injectors, turbo chargers and transmissions, without taking on a cumbersome CAD program.

Yet, Designer still offers CAD-like attributes such as dimensioning, ruler settings to 1/100th of an inch, 64 layers to work on and object snap for perfect alignment.

Like the engineers at the Medium Engine Division, you'll appreciate Designer for its wealth of other capabilities. U.S. and metric ruler options. Scalability. A fully customizable tool bar. OLE and ATM support combined with over 175 bundled fonts from Adobe, DTC and ITC. As well as support for color bitmap images.

It's why Micrografx Designer won *PC Magazine's* Editors' Choice Award three times in a row and is the only illustration program to ever win *PC Magazine's* Technical Excellence Award.

Using it can be quite a moving experience.



**M I C R O G R A F X<sup>®</sup>**

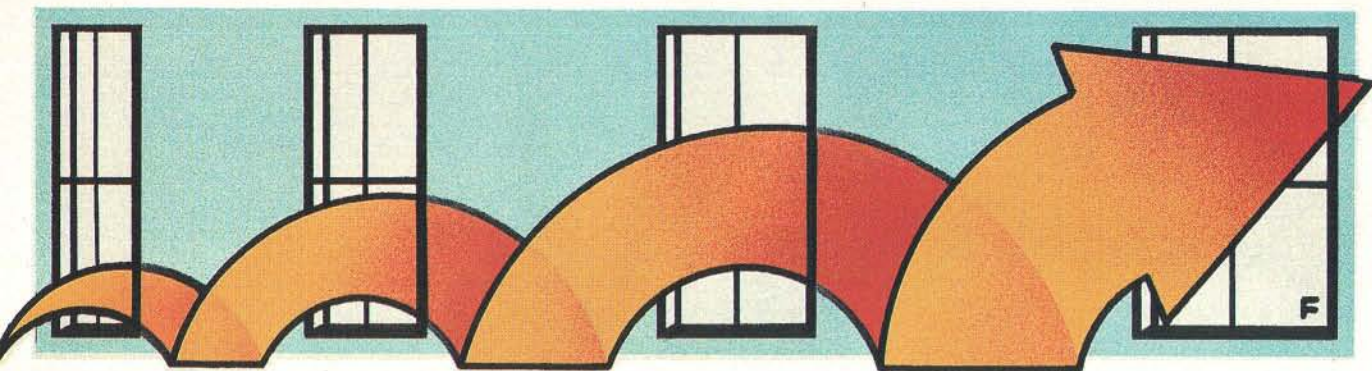
Micrografx, Inc. 1303 Arapaho, Richardson, TX 75081 (214) 234-1769. Micrografx has offices in Toronto, Paris, London, Munich, Milan, Sydney, Copenhagen and Tokyo. Copyright © 1992, Micrografx, Inc. All rights reserved. Micrografx is a registered trademark and Micrografx Designer is a trademark of Micrografx, Inc. All other products are trademarks or registered trademarks of their respective owners. Working model does not show OLE, ATM and TrueType capabilities. Micrografx Designer has not been endorsed by the Medium Engine Division of Caterpillar, Inc.

"Before our engines move  
the earth,  
Designer powers our ideas."

— Mark Richardson,  
Medium Engine Division, Caterpillar, Inc.



Circle 103 on Inquiry Card.



# Using Windows NT

A behind-the-wheel report on what it's like to use Windows NT

JON UDELL

If all goes according to Microsoft's plan, Windows will soon be a family of products: Windows 3.1, Windows for Workgroups, Windows NT, and LAN Manager NT. The evolutionary Windows for Workgroups, a long-rumored peer-networking version of Windows 3.1, will debut in the spring of 1993. The revolutionary Windows NT (and its server edition, LAN Manager NT) is due even sooner—by the end of this year. In "Windows NT Up Close" (October BYTE), I wrote at length about the key technologies—such as symmetric multiprocessing and layered device drivers—that lurk underneath NT's hood. Here I'll tell you what it feels like to use Windows NT.

A machine that's running NT looks for all the world like a machine running Windows 3.1. Windows applications such as Excel and CorelDraw launch and multitask under the control of File Manager and Program Manager. Multiple DOS applications like dBase IV can run as well, in windowed or full-screen sessions.

Although Microsoft has overhauled the plumbing completely, NT's familiar face proclaims continuity with the DOS/Windows installed base. How can you tell the difference between Windows NT and Windows 3.1? One giveaway is Program Manager's File menu. The Exit Windows option in Windows 3.x becomes a Logoff option in Windows NT. If you select it, NT shuts down and asks you to use Ctrl-Alt-Del to log on again.

The log-on procedure (also required after a cold boot) will be familiar to users of Unix, VMS, OS/2 Extended Edition, and many other operating systems. If your only experience has been with DOS and Windows, however, you may suffer momentary culture shock. Even when you're running a stand-alone NT system and you're the only user of that system, you've got to "authenticate" yourself to use it.

Note that while you can log in as administrator of your own system (the equivalent of *superuser* in Unix), it's probably wiser not to. One of the benefits of NT's security system is that it can protect you from yourself. Wielding administrative power can be dangerous, since you're free to damage valuable programs or data. The DOS/Windows user, automatically and always a superuser, all too frequently does just that. In NT, just as in single-user Unix, it's better to run with a powerful set of user privileges most of the time and to assume administrative status only when absolutely necessary.

If your password checks out, you'll land in a version of Program Manager that's nearly indistinguishable from its Windows 3.x counterpart. NT boots directly into the GUI environment—you don't land in DOS (or rather, the NT command console) and then run Windows as an option. Since porting Program Manager to NT was straight-

forward, it's reasonable to expect that your favorite replacement shell (e.g., Norton Desktop for Windows, WinTools, and NewWave) will be available as well.

## Subtle Changes

When you launch a program from Program Manager, you may notice a subtle behavioral change. Windows 3.x turns the cursor into an "I'm busy" hourglass while you wait for an application that you've launched to load into memory. NT, however, returns control to you immediately. While the application loads, the cursor becomes an arrow/hourglass hybrid called the *startglass*, which means "NT's loading something, but you can keep working." You can start three or four programs with a rapid-fire sequence of double-clicks and then switch to an already-active application while you wait for the programs to load in the background.

As with OS/2, applications have to be specially written to exploit NT's multithreading. If the Windows version of your favorite application can't print or recalculate in the background, a naive port of that application to NT won't be able to, either. Over time, if NT gains sufficient market share, developers will offer a family of Windows products. High-end versions will target NT and exploit its advanced multithreading and graphics features. Low-end versions will make do with what Windows 3.x provides, optionally using an NT-like 32-bit flat-memory model by way of a Windows 3.x add-on called Win32s.

While applications that exploit multithreading will be optimally responsive, a single-threaded NT application does behave more intelligently than its OS/2 Presentation Manager equivalent. OS/2, although multithreaded, inherits the Windows input model. All applications share a common message queue. If any program fails to pull messages out of the queue, the whole PM interface hangs. But NT gives each application its own message queue, so if one program doesn't fetch its messages, the others don't suffer.

This rather arcane technical distinction

has an immediate and obvious practical benefit. If you start a lengthy recalc in your favorite Windows spreadsheet (either the 16-bit Windows version or a naive, single-threaded NT version), you'll see an hourglass cursor—but only while the cursor remains in the spreadsheet's window. As soon as the cursor drifts outside that window, you regain control and can interact with other applications. NT delivers on the promise of preemptive multitasking: The user can preempt the system.

### DOS and Windows

One of the items in Program Manager's Main group (as of the July beta version) is the same MS-DOS Prompt icon that appears in Windows 3.1. As you'd expect, it launches a console window. The command shell running in that window supports the MS-DOS utilities and batch language, but it's really a 32-bit NT console application (as are external utilities like CHKDSK and XCOPY).

From the command line you can launch any flavor of application that NT supports: DOS, 16- and 32-bit Windows, OS/2, and Posix. (Support for all but Posix shipped in the July beta.) NT automatically invokes

the subsystem needed to support the program whose name you type. If you launch a Windows program this way, control will not return to the console until the application quits. To spawn a Windows application—say, CLOCK—without losing control of the console, you type START CLOCK (as in OS/2). Piping works across subsystems, so you can send the output of the NT-native DIR command into a filter program written for DOS or OS/2.

Ideally, you'll run native 32-bit Windows applications on NT, but DOS and 16-bit Windows applications work fine, too. That's just what you would expect on 386/486 hardware, but rather surprising if you happen to be running NT on a non-Intel computer like the Mips R4000-based Magnum. How does it work? The foundation technology is Insignia Solutions' 286 emulator, SoftPC.

You're not stuck in the emulator all the time, however, since DOS and Windows API calls (e.g., file I/O and memory management) map through to their native NT counterparts. That's especially significant in the case of Windows. A typical Windows application spends more time executing Windows code than it spends exe-

cuting its own. Under NT, therefore, that 16-bit Windows application spends most of its time in a 32-bit Windows kernel that runs natively on both CISC and RISC hardware. If this approach pans out—and early indications are promising—it could suddenly legitimize RISC processors as engines for standard business PCs as well as exotic technical workstations.

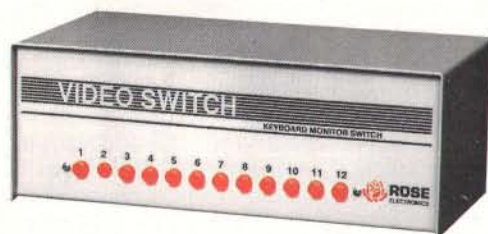
NT's DOS/Windows support is, in one respect, less ambitious than OS/2 2.0's: On Intel machines, real-mode software, including device drivers, can't touch the 80x86 hardware. You'll need native NT drivers for SCSI drives, network adapters, and other peripherals. Two factors work in NT's favor here: Drivers are portable, and they conform to a layered model that cuts down on the work needed to support specific devices. One early hopeful indication is that NT already supports nearly all the printers that Windows 3.1 does.

### Networking

Windows NT is workgroup-capable right out of the box. As with Macintosh System 7.0, every machine can play the role of server, client, or both. The similarity extends to the point-and-click graphical tools

# Your Choice of Keyboard Monitor Switches

Access multiple computers with a single keyboard and monitor to cut equipment costs, save valuable space, and end clutter



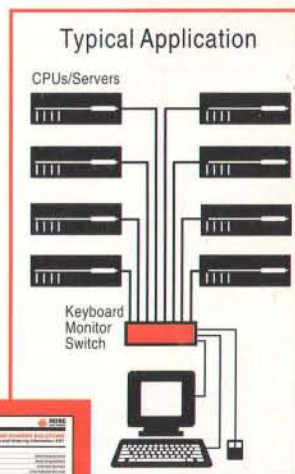
Manually controlled unit

- Simple pushbutton operation for quick selection
- Four, eight, or twelve ports per unit
- Daisy-chaining connects unlimited number of CPUs
- Compatible with EGA, VGA, Macintosh, Sun, and others
- Optional keyboard booting for 286, 386, and 486
- Optional RS232 or PS/2 mouse interface
- PCB construction for high reliability and low crosstalk
- Rack mount, matrix, and customized units available

- Switch by keystroke, from front panel, or RS232 port
- Two or four ports per unit
- Cascade units to support up to 255 CPUs
- Supports monochrome, EGA, and VGA
- Includes keyboard booting for 286, 386, and 486
- Includes RS232 and PS/2 mouse interface
- LEDs display selected CPU and CPU power-on
- Scan function switches among CPUs automatically



Keyboard controlled unit



Call toll-free now for your copy of our Switching and Sharing Solutions catalog.

Other Rose products: Print servers, printer sharing units, print buffers, keyboard monitor extenders, video splitters. All Rose products are US-made and have a 1-year warranty.

# Make the Rose Connection

10850 Wilcrest Drive • Houston, Texas 77099 • Phone (713) 933-7673 • Fax (713) 933-0044



1-800-333-9343



# The only Windows™ statistics package you'll ever need.

**NEW**  
SYSTAT® for WINDOWS

Rated "the best general-purpose statistics program" for the PC by *Software Digest*®, SYSTAT for DOS is now joined by SYSTAT for Windows. This addition to the SYSTAT family takes full advantage of Windows, with pull down menus, dialog boxes, sizable windows, and the ease of use you expect in a Windows package.

SYSTAT for Windows runs in standard and 386 enhanced modes and can take advantage of Windows advanced memory management. No matter how large or complex your analysis is, you can use SYSTAT.

SYSTAT delivers a balance of power and simplicity. It lets you analyze and manipulate data

with a comprehensive range of advanced statistical procedures, and present your results with stunning graphics.

### Just point and click

SYSTAT is a full-fledged Windows application. Just point and click. SYSTAT's QuickStat™ buttons give you simple, single-click shortcuts to common statistical analyses.

### More statistics, from the basic to the most sophisticated

A full range of univariate and multivariate statistics—from *t* tests to multidimensional scaling. With a few clicks you can turn most statistics into graphs and perform:

- multiway crosstabs with log linear modeling
- nonparametric statistics
- principal components and factor analysis
- cluster analysis
- time series
- nonlinear estimation
- correlation matrices
- means, effect, and dummy models
- post hoc tests

SYSTAT offers the most advanced multivariate general linear model available for Windows.

### The most graphics

No other statistical or graphics package can produce all the scientific and technical graphs that SYSTAT can—nor surpass its ease of use. Graphics capabilities include:

- histograms
- single, multiple, stacked, and range bar graphs
- single and grouped box plots
- stem-and-leaf diagrams
- pie charts
- scatterplot matrices
- 3-D data and function plots
- contour plots
- control charts
- maps with geographic projections
- Chernoff faces
- complete color spectrum
- log and power scales
- confidence intervals and ellipses
- linear, quadratic, step, spline, polynomial, LOWESS, exponential, and log smoothing

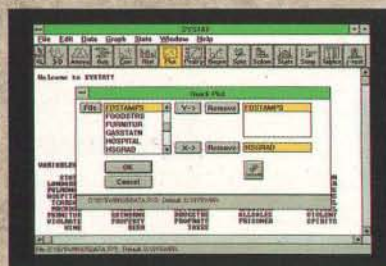
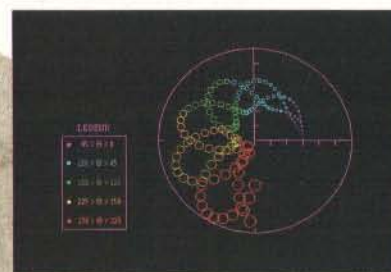
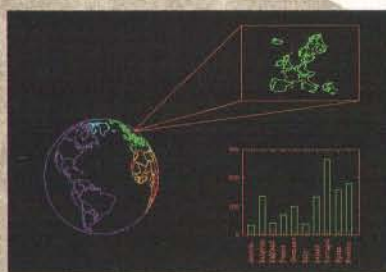
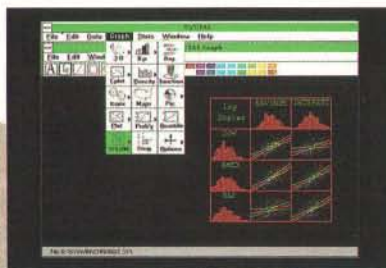
### A compatible family of products

Whichever you choose—SYSTAT for Windows, SYSTAT for DOS or both—you'll enjoy the most powerful statistics and scientific graphics software available for the PC.

For more information, special offers for current users, and demo disks, call:

**708-864-5670**

For Windows circle 128,  
For IBM/DOS circle 129.



For more information call or write: SYSTAT, Inc., 1800 Sherman Avenue, Evanston, Illinois 60201-3793. Tel: 708.864.5670, Fax: 708.492.3567

Australia: Hearne Marketing 61.3.8661766, BeNeLux Countries: Oasis 31.3402.66336, Denmark: Agrolab 45.64.406575, France: Deltasoft 33.76.418506, Germany: STATCON 49.55.4272075, Italy: PiSoft 39.587.213640, Japan: HuLinks 81.33.5902311, Malaysia: Dagang Teknik 6.03.719.8299, New Zealand: Hoare & Assoc. 64.78.562675, Spain: AddLink 34.3.4590722, Switzerland: Fritschy & Partner 41.31.215151, SYSTAT UK: 44.81.4620093

© 1992 SYSTAT®, Inc. *Software Digest Ratings Report*® 5, May, 1991. Software Digest is a registered trademark of NSTL, Inc.

**SYSTAT**

NT provides to manage users and groups that can access the file and print services it exports and to control the sharing of files and printers. (These tools are packaged as extensions to File Manager and Print Manager.) If you're running an SMB/NetBIOS LAN already (e.g., LAN Manager 2.1), NT will plug into it. You can also tap into Unix networks, since NT bundles the TCP/IP protocol and standard utilities.

My NT machine was well connected to the BYTE networks from day one. I read my Internet mail using the NT version of Windows Terminal. While I can't access our Novell servers directly—there's no NetWare client for NT yet—I can move files between NetWare servers and NT from my DOS/Windows machine, thanks to LAN Manager 2.1's dual-shell NetWare connectivity feature.

Windows 3.1 defines a set of common network services to support activities like browsing for and connecting to remote drives and printers. NT extends these and supplies an umbrella network driver so that a third-party service provider such as Novell's NetWare can seamlessly merge with the interface presented by NT's native network services.

NT's intrinsic peer networking isn't an enterprise solution, of course. Larger installations will use LAN Manager NT to provide one or more dedicated servers and to augment the basic network services with high-end features like domainwide (i.e., multiserver) administration, fault-tolerant storage, and Macintosh support.

A less visible aspect of NT networking is the distributed capability built into many of the tools. NT's RPC (remote procedure call) protocol enables all sorts of wonderful magic. The new Print Manager illustrates the point nicely. With Windows 3.1, every client using a networked LaserJet IIIsi has to install the HPPCL5A driver. With NT, only the server that connects to the printer needs to install that driver. The client's Print Manager uses RPC to ship print jobs to the server's Print Manager.

RPC-enabled tools also promise to radically simplify the management of NT networks. For example, all configuration data for an NT machine—CONFIG.SYS, AUTOEXEC.BAT, .INI files, and every additional scrap of user or machine or application data—lives in a single registration database. You'll be able to point the tool that views and edits that database at your

local machine, or (with the right privileges) any other machine on your network.

**The Big Picture**

So what's the catch? Well, Windows NT has a hefty appetite for resources. The current beta version requires 12 MB of RAM and prefers 16 MB. Although it's likely to shrink some by final release, NT obviously doesn't target the 4-MB 386 that is standard for today's corporate desktop.

Will NT play the role of server? Clearly it will. But effective enterprise computing requires capable clients as well as capable servers. Putting a robust and manageable operating system on the desktop just might be worth more to your company than the cost of the hardware to run it. Moreover, today's multiprocessor, drive-array-equipped superservers will probably become the desktop PCs of tomorrow. If you find yourself with multiple CPUs and disks at your disposal, NT will put them to good use. ■

*Jon Udell is a BYTE senior technical editor at large. You can contact him on BIX as "judell" or on the Internet at judell@bytepb.byte.com.*

**WINSLEUTH GOLD™**

**SUSPECT, DETECT AND CORRECT!!!™**

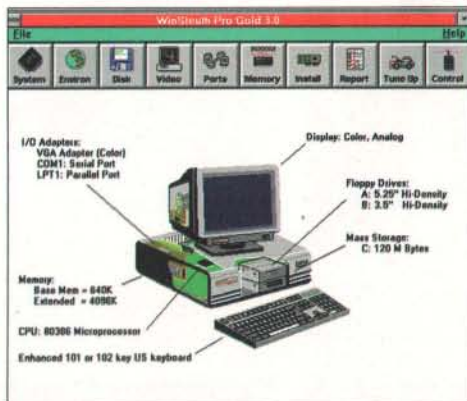
**WINSLEUTH™ GOLD**

WinSleuth Gold is the first tutorial/analysis/diagnostic program specifically written to operate under Windows 3.0/3.1. A newly enhanced graphical user interface makes WinSleuth Gold the easiest WinSleuth to use, EVER.

Novice and advanced users will appreciate WinSleuth Gold's access to low-level information and functions. WinSleuth Gold can actually test and evaluate memory chips, serial and parallel ports, the video adapter and other vital system components. New users will find the on-line help facility valuable as a learning aid. WinSleuth Gold helps make complex aspects of computing such as IRQs, hard disk drives and video easier to understand.

TuneUp is now more comprehensive in its analysis and not only can make performance-enhancing suggestions, but with a set of NEW 'smart editors', can make changes to system settings automatically that improve Windows operation! Installation Assistant is a partner in the frustrating task of installing new hardware. With Report Generator send hardcopy to the printer, or an ASCII file for import into your database manager.

PC Computing, July, 1992 - BEST VALUE - "WinSleuth...is a godsend to Windows users intent on fine-tuning their systems." "WinSleuth...is exceptionally easy to use." - Preston Gralla



BYTE Magazine, March, 1992 - First Impressions. "WinSleuth...is one of the few programs that I consider absolutely and positively necessary on my PC. One...should be on yours, too." - Stan Miastkowski

LIMITED TIME OFFER!  
Order NOW!  
Get CO/Session--  
remote control program

MSRP  
WinSleuth (\$169.00)  
AND  
CO/Session (\$179.00)



ONLY  
**\$99!**

Questions? Call:  
714-236-1385  
**DARIANA, INC.**

**COMPUCLASSICS**  
YOUR SOURCE FOR SOFTWARE

**800-827-1994/818-347-7500/FAX 818-347-9977**

# PICTURE WINDOWS.

**Picture This...** a real-time television monitor built right into your PC... Now, picture using this monitor while running Windows™ 3 applications **at the same time...** And, picture taking that video image and resizing, (**right down to crystal-clear icon size!**) or clicking and dragging it to any position on the screen as easily as moving any other Window...

... what you can! Any Windows 3 user can access 122 channel television reception with the built-in tuner, plus two additional video sources, (such as VCR, video camera, laser disk, etc.,) all with stereo audio capability! Automatically fit real-time video images to any size Window while running your other Windows 3 programs. *Hauppauge Computer Works* produces **Win/TV™**, the Windows television adapter.

**Picture Perfect.** A "frame-grabber" feature allows you to capture any desired "still" from a video source and save it to disk. With **Win/TV**, you can integrate video images into multi-media applications such as training or marketing presentations. All you need is Windows 3, a VGA monitor, and a system with a spare 16-bit I/O slot, and you are ready to view a whole new world of video creativity!

**Picture Yourself** owning your own "Windows on the World"! Maybe you want to work on your spreadsheets but don't want to miss an important news flash or a current stock market report. **Win/TV** is *perfect* for you. Keep an eye on current events while keeping control of your inventory... No problem!

Get the new **Win/TV** and open a window on some fresh, new and exciting possibilities.

Available Internationally from:

Hauppauge Computer, Australia

07-262-3122

E.I.E., Japan

03-3572-3442

Hauppauge, Germany

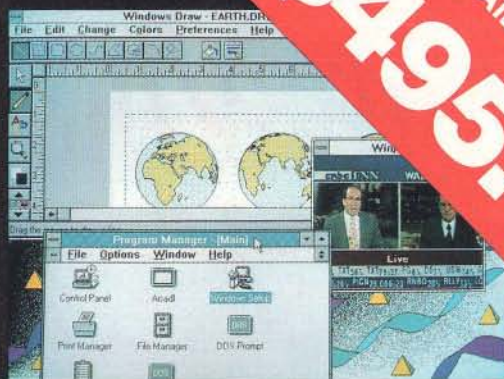
02161-17063

Hauppauge, U.K. 071-378-7309

GS00K92AGS6156

Circle 91 on Inquiry Card.

SUGGESTED  
RETAIL  
**\$495.**



*You're never out of touch with your own personal "Windows on the World"!*



*Resize or reposition your Win/TV Window anywhere on the screen—while running other Windows applications.*



*Capture the perfect "still" with "Frame Grabber" feature—great for presentations with impact.*

## Hauppauge!

Hauppauge Computer Works, Inc.  
91 Cabot Court • Hauppauge, N.Y. 11788  
In N.Y. Tel: (516) 434-1600 • Fax (516) 434-3198  
Toll Free: 800-443-6284 • In Europe: (49)-2161-17063

# Will the Real Multimedia PC bargain please stand up!

## Which system would you buy?

If you've been sold on the benefits of a multimedia system- for education, for training, for business presentations- but are confused about what to buy or how much to spend, take a look at Media Resources' MPC compatible hardware and software products.

### SYSTEM 1 - [with Media Resources MediaKit\* installed].

- ✓ Music is reproduced using digital 'samples'.
- ✓ 128 instruments with samples (stored in almost .5 MB ROM).
- ✓ Sounds like real music!
- ✓ 12-bit high-precision digital audio recorder.
- ✓ Features SONY CD ROM Drive.
- ✓ Music is played!

\*Featuring M-R DSC-01 General MIDI workstation board.

### SYSTEM 2 - [with an entry-level MPC kit\*\* installed].

- ✓ Music is created using old fashioned FM synthesizers.
- ✓ 22 instruments, no samples in ROM.
- ✓ Sounds like a TV video game.
- ✓ 8-bit medium-precision digital audio recorder.
- ✓ Features Matsushita CD ROM Drive
- ✓ Sounds are 'blasted'

\*\*Featuring Creative Lab's 'Sound Blaster Pro'.

In addition to offering hardware with the best price-performance values, we view quality software as a key component to the utility and enjoyment of your investment in MPC products. Working with such renowned publishers as MICROSOFT, GOLD DISH CORP., MIDISOFT, COREL, COMPTON'S NEW MEDIA, THE SOFTWARE TOOLWORKS, BRIGHTSTAR and others our MediaPak bundles bring you top quality CD-ROM titles at significant savings!



Media Resources  
"The Specialists in  
Computer-aided Imagination"

714 256-5048

640 Puente Street • Brea, CA,  
92621

Look to Media Resource for the latest advances in MPC multimedia technology, digitally sampled sound, full-motion video, Add-ons and the BEST in CD-ROM software titles for Education, Entertainment and Business use.

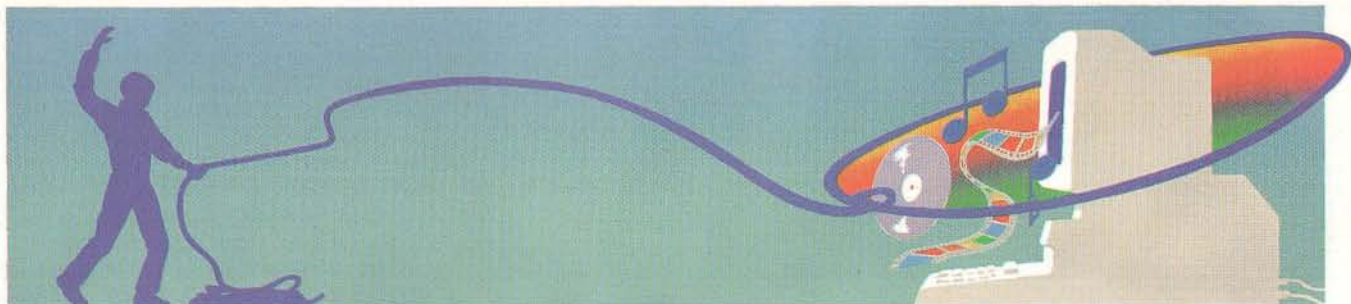
# Media Kit

by Media Resources

## Why buy anything else?



Circle 151 on Inquiry Card (RESELLERS: 152).



# Windows Speaks

Bring multimedia to your desk

TOM YAGER

**W**ith the release of Windows 3.1, Microsoft tantalized users of this popular graphical environment by including, as standard, the Windows Multimedia Extensions, a set of drivers, libraries, and applications that bring the impact of multimedia to everyday computing. With a little added hardware, you can listen to CDs; embed sound, graphics, and animation into your database or business presentation; learn a new skill with unaccustomed ease; or be entertained in a manner previously reserved for noisy arcades.

As interesting as all that sounds, multimedia isn't automatic. True, some applications make multimedia seem effortless, but even basic multimedia requires a little preparation. In a previous article (see "The Multimedia PC: High-Powered Sight and Sound on Your Desk," February BYTE), I discussed MPC-compatible hardware; now it's time to discuss the software in some detail. So many media types are supported by the Extensions that it would be foolish to try to cover them all in one article this size. Instead, I'll focus on the most commonly used media type: audio.

As a user, you should understand what multimedia brings to you and how to put it to work. As a developer, at least a moderate understanding of what it takes to build multimedia capabilities into your programs will help you stay competitive. In this article, I'll try to provide enough detail to help you decide—be you user, developer, or both—whether the Extensions are worth the trouble to use and implement.

## The View from Above

Although the most visible portion of the Extensions is their set of standard applications, the package's reach extends deeper than that—into the heart of Windows itself. The Extensions patch themselves into Windows through two layers of software (see the figure). At the bottom level, drivers provide software pathways to direct control of hardware. Some multimedia devices, particularly digitized audio boards, are demanding. The driver's job is not only to control the device but also to hide as much as possible of the device's complexity from the layers of software above it.

Multimedia drivers are loaded, unloaded, and configured through the Control Panel interface under the new driver's icon. This works better than hand-editing SYSTEM.INI to configure new drivers. Now vendors can package their drivers on disks structured to install easily from the Windows Control Panel. Loaded drivers are tagged with a brief mnemonic identifier, such as *wave* for the digital audio device and *midi* for the on-board sequencer. You can have multiple drivers of the same type loaded simultaneously, allowing for complex multiboard configurations.

In the BYTE Multimedia Lab, I use this feature to use Roland's GS Sound Card professional music synthesizer in addition to the FM synthesizer on my system's Sound Blaster Pro or Pro Audio Spectrum card. The FM synthesizer is configured as *midi*, and the GS Sound Card as *midi1*. Not all software allows you to choose from among installed drivers; the default is to use the first installed driver of a given type.

Also listed among the drivers are the MCI (Media Control Interface) drivers. These aren't all drivers in the traditional sense: Not all of them are responsible for controlling hardware. But all the MCI drivers support a marvelously simple command architecture (which I'll describe later). This reduces the complexity of multimedia applications and allows them to maintain a high degree of device independence.

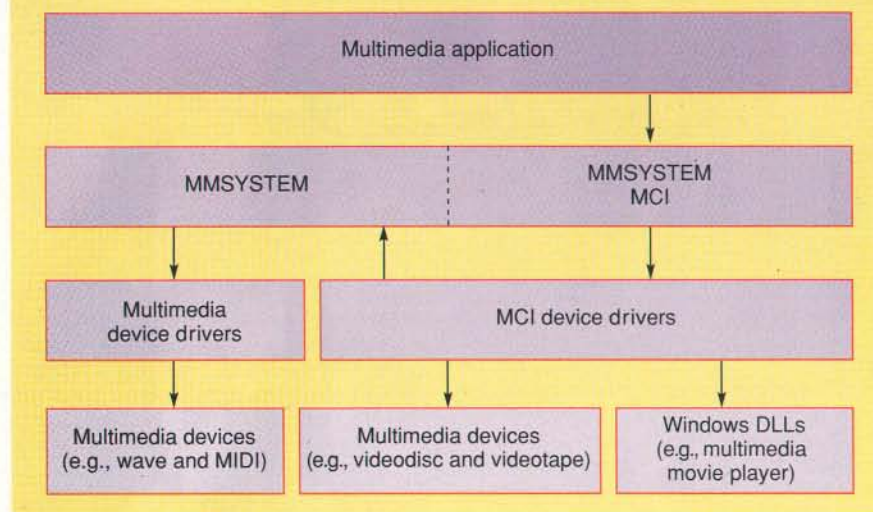
Sitting above the device drivers and tying them together is the MMSYSTEM module, which takes in application requests, loads the drivers as necessary, and passes traffic to and from the drivers as requested. This provides a standardized low-level path to the device drivers, and it's exclusively with this module that well-behaved applications converse to make multimedia happen.

The MMSYSTEM module maintains law and order: Vendors who wish to make their hardware part of the Extensions *must* plug it in through this module. That's why, even though the Extensions are new, an incredible number of audio boards are already on the market. You can buy any one of them, and unless the manufacturer did a botched job on the drivers, it will immediately work with all your multimedia applications.

If the Extensions were built around selected vendors' hardware instead, capabilities would be frozen at 1992's state of the art forever. As it stands now, vendors have plenty of room to innovate in hardware, as long as they provide drivers that give the MMSYSTEM what it wants. This is the kind of proprietary standardization that's worked so well for Apple for so many years, and it is among the things that make the Extensions so likable.

*continued*

## THE MCI ARCHITECTURE



*Multimedia applications operate through two intervening layers, greatly simplifying the interfacing of hardware and software. (From Microsoft Windows Multimedia Programmer's Workbook. Reprinted by permission of Microsoft Press. Copyright © 1992 by Microsoft Corporation. All rights reserved.)*

### Use Your Ears

Making multimedia a part of your everyday work requires some adjustment. First, you have to change your attitude: It's so strange to listen to your computer. In fact, I think that one of the reasons speech recognition never took off is that most people are embarrassed to talk to a machine. And you'd be surprised how difficult it is to get used to having your computer "talk" to you. At BYTE, where some editors are stationed in low-walled cubicles, I'm bashful about turning the volume on my system's speakers up high enough that I can hear them. Once I got used to it, I still drew chuckles and visits from those nearby because of the sounds that my machine made. Macintosh and Amiga users have had sound as part of their systems for years, but it takes a while for PC users, unaccustomed to anything more than beeps and squawks, to grow used to the clear voice, sound effects, and music that the Extensions bring to your desk.

The other adjustment requires that you recognize where multimedia might help you in your work and find a way to use it. Microsoft provides some help in this area by including standard applications with the Extensions. There's nothing fancy about them, but through them, you can explore the audio portion of your system's multimedia capabilities. There is also support for animation, but because the animation (for now) has to be created on a Mac, I see little point in discussing it.

The standard applications primarily play

back material created elsewhere and control how that material is reproduced. The most versatile application is the media player; it plays anything as long as there's an installed MCI driver for the type of data that you want to hear or see. The media player presents a row of buttons like those on a VCR.

This calls out one of the benefits of the MCI: Every multimedia device supports the same basic set of commands. Insert an audio CD and press the play button, and you'll hear the music. Pull down the File menu and open a digital audio file, and the play button will play it. The same is true of MIDI. Remarkably, you needn't understand anything about any of the technologies to put them to use. The play, stop, and pause buttons all do what you'd expect them to, regardless of the type of device the media player is controlling.

The only standard means of creating your own material is the sound recorder, which lets you capture up to a minute of digital audio from your sound board's microphone jack. Some audio boards (e.g., the Pro Audio Spectrum) include a proprietary mixer application that lets you record from any of the sound board's sources—the microphone, line ("aux") input, and CD audio. The sound recorder brings sounds into memory and lets you save the audio in the standard Extensions format, using a .WAV filename extension.

Again, thanks to MMSYSTEM's influence, every multimedia application that uses the Extensions can exchange data with every other application. All the file

formats are strictly defined, so the sound you record in the sound recorder can be played back in the media player or whatever program you choose.

The remainder of the standard programs are more fun than practical, but they still have their place. The Extensions divert the standard Windows MessageBeep routine, which on a dull machine pops up a warning or informational dialog box and signals its arrival with a beep from the PC's internal speaker. With the Extensions, you can associate (through the Control Panel) a different digital audio file with each type of dialog box. You can also specify that certain sound files be played on Windows start-up and shutdown. The files must fit in memory to be played this way, but this feature adds a new dimension to using Windows. Finally, a revised version of the alarm-clock application plays specified sound files as hourly/half-hourly chimes and as alarms.

Clearly, the standard programs don't create a full-fledged multimedia solution. Commercial multimedia applications will help you take better advantage of your system's multimedia faculties. For those programs not specifically equipped to take advantage of the Extensions, you can use OLE (Object Linking and Embedding) to embed multimedia objects in your data. The media player is an OLE server, so you can embed a multimedia object in, say, your word processor document and play the associated file by double-clicking on the icon. Of course, this assumes that your word processor uses OLE.

The more complete solutions come in commercial applications. Using the Extensions to develop those applications is the focus of the next section. You need not be a developer to derive some value from what follows; understanding how the Extensions are implemented in programs may help you use them more effectively.

### All Singing, All Dancing

Compared to the rest of the Windows API, Microsoft's multimedia support seems out of place. It is, for the most part, remarkably well designed and easy to implement. So, unlike with Windows in general, it's possible for programmers of any skill level to incorporate multimedia into their applications. In fact, if you use a programming system that eliminates the necessity of your making Windows calls to put up buttons and text, you can count on being able to build multimedia programs with relative ease. Using the command-message interface (which I'll describe shortly) is more of a job for C or C++ programmers.

There are roughly three levels of programming support in the Extensions. At

# Bigger Windows



**TWO-YEAR WARRANTY**

**16" FINE DOT PITCH CRT**

**VERY HIGH RESOLUTION**

**COLOR CALIBRATION SYSTEM**

**LOW EMISSION DESIGN**

The new Diamond Scan 16 lets you take full advantage of all Windows™ applications for increased productivity. The 16" CRT provides over 39% more display area than 14" monitors and 19% more than 15" FS monitors, without taking up additional desktop space. The larger screen size lets you work a variety of on-screen applications at the same time.

The fine 0.28 mm dot pitch, Dynamic Focus and high video bandwidth provide greater overall clarity of details. And with its wide auto-scan range, the Diamond Scan 16 keeps pace with all of the new high-refresh EVGA through 1280 x 1024 non-interlaced graphics standards. In addition, the Diamond Match Color Calibration System further enhances use in color-critical desktop publishing applications.

So if you demand the best, demand the Diamond Scan 16. For more information, call Mitsubishi Electronics at 1-800-843-2515 or in Canada 1-800-387-9630.



Mitsubishi Electronics America, Inc., Information Systems Division, 5665 Plaza Drive, Cypress, CA 90630.  
Mitsubishi Electric Sales Canada, Inc., 4299 14th Avenue, Markham, Ontario L3R 0J2.

© 1992 Mitsubishi Electronics America, Inc. All trademarks or registered trademarks are the property of their respective holders. Actual unretouched screen image produced from Modern Medium Inc. (RenderStar 2).

**Circle 197 on Inquiry Card.**



the bottom are the low-level services, which give you minute control of devices but also make you do a lot of the grunt work yourself. Low-level services talk directly to the MMSYSTEM module, so you retain the benefits of device independence and enforced standards. But you pay for that degree of control: Using this level, for example, you have to shovel data into the sound card on schedule to get a digital audio file to play. If you're planning on writing an application that needs access to the data streams that run to and from your devices, the low-level services are your only choice. These calls aren't as useful as the calls at the higher levels because they make you worry over every little detail, but when you need them, you need them.

The next level up is less trying. Dubbed the *command-message interface*, this intermediate level uses the MCI drivers to indirectly control multimedia devices. A standard set of commands, most of them associated in action to the buttons on the media player, are applied to all MCI-compatible devices. One notable difference is that, unlike the media player, the command-message interface can record.

The sequence required to drive an MCI

device through the command-message interface varies depending on the type of device, but not by much. Some devices, such as the digital audio and MIDI support, have files associated with them that must be opened before any command can be issued. These are called *compound devices*, and they contrast with *simple devices* (e.g., CD audio and videodisc players) that aren't associated with files.

Opening a compound device is only a little more complicated than opening a simple one: First, you fill in a data structure (of type MCI\_OPEN\_PARMS). You must specify the filename, called the *device element*, used to hold the data to be played or recorded. You can also set the device type from a list of predefined constants, but this might be somewhat limiting. For example, what if you have installed a new compound device not associated with one of the Microsoft-supplied constants? One way to avoid this is to specify the data filename and leave the device-type element of the structure set to NULL. As long as the name includes a three-character extension that's uniquely associated with a device through SYSTEM.INI entries (the Extensions set up the standard devices for

you this way), the MCI will figure the device type automatically. You can avoid using constants for simple devices by specifying the filename of the driver instead.

Another element of MCI\_OPEN\_PARMS holds the handle to the window that's set up to receive the MCI messages. On request, the MCI will notify you when a command is completed, posting a message (of type MM\_MCINOTIFY) to the window procedure associated with the specified handle. It can also notify you if an error occurs or if a command that was expecting a message on was interrupted.

Once you've filled in the MCI\_OPEN\_PARMS structure, you pass a pointer to it, along with a constant that describes the command you wish executed (MCI\_OPEN) to the MCI through the mciSendCommand function. The open command returns a device identification that you can use to send other commands to the device.

Other commands are executed similarly. When a command requires additional data, an appropriately filled associated structure must be passed to the MCI to provide that data. The MCI also returns data through these structures. In addition to the requisite open, play, stop, record, and

# ATech

## Catch the Aitech Wave and You're Riding on Top of the Desktop Video World!

### VIDEO IN

IMAGE DATA BASE • SLIDE SHOW CREATIONS • DESKTOP PUBLISHING

#### IMAGE CAPTURE

##### Pro64 & Pro256

- ~ Gray scale image capture boards.
- ~ Perfect for Desktop Publishing and Industrial Imaging applications.

##### ProColor & ProColor Plus

- ~ Color image capture boards.
- ~ Perfect for slide creations, image data base applications and more!

#### FULL MOTION VIDEO

##### ProPC/Video

- ~ Perfect for computer base training applications, Interactive Kiosks and more.

### VIDEO OUT

PRESENTATIONS • INTERACTIVE TRAINING • VIDEO CREATIONS

#### VGA TO VIDEO - INTERNAL

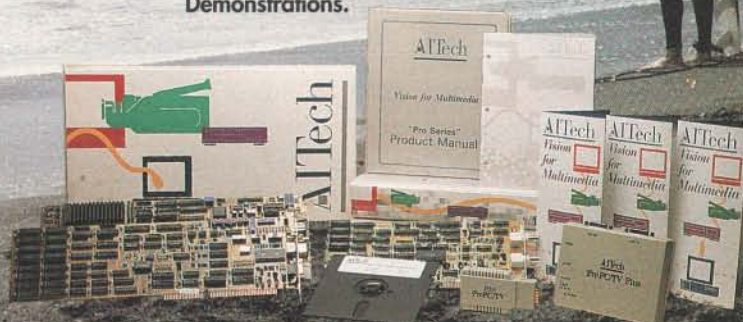
##### ProVGA/TV & ProVGA/TV Plus

- ~ VGA to Video genlock/overlay boards.
- ~ Perfect for Presentations, Video Training, etc.

#### VGA TO VIDEO - EXTERNAL

##### ProPC/TV & ProPC/TV Plus

- ~ Pocket size, portable VGA to Video encoder.
- ~ Perfect for Training, Presentations and Demonstrations.



Aitech International, World Headquarters, 830 Hillview Court, Suite 145, Milpitas, CA 95035  
408 946-3291 1-800-882-8184 FAX 408 946-3597



# Picture Windows



**TWO-YEAR WARRANTY**

**TRINITRON® 17" CRT**

**VERY HIGH RESOLUTION**

**COLOR CALIBRATION SYSTEM**

**LOW EMISSION DESIGN**

The Mitsubishi Diamond Pro® 17 is the ideal Windows™ monitor for desktop publishing, general business, multimedia or entry-level CAD. It offers a large display with the most compact enclosure of any 17" flat-square or Trinitron monitor.

The auto-scanning, high-resolution Diamond Pro 17 has a fine pitch (0.25mm), vertically flat, square-cornered CRT and features Mitsubishi's DigiCon™ digital convergence control and the Diamond Match Color Calibration System for color-critical applications. It's compatible with all medium- and high-resolution graphics standards from VGA through 1280 x 1024 at 60 Hz non-interlaced as well as the popular flicker-free 1024 x 768 high refresh rates up to 76 Hz non-interlaced.

For more information, call Mitsubishi Electronics at 1-800-843-2515. In Canada, call 1-800-387-9630 or in Mexico 91-800-83456.



Mitsubishi Electronics America, Inc., Information Systems Division, 5665 Plaza Drive, Cypress, CA 90630.  
Mitsubishi Electric Sales Canada, Inc., 4299 14th Avenue, Markham, Ontario L3R 0J2.

close commands, the MCI offers detailed information about the MCI system, device types, and specific devices. Using the information and status commands, you can find out how many MIDI ports you have, whether the MCI device you specify can record, or what the playback location of a playing device is. Applications should make liberal use of this feedback. Although it's possible to create working programs that are "blind," it's better to know what your environment is in case the user wants

to change or adapt it somehow. The previously mentioned principle bears repeating: Your program should know how many devices of a given type are installed on a system and allow the user to choose from among them at run time.

**The MCI on a String**

The top level of the MCI is the *command-string interface*, and this is the level that's most accessible to programmers (and non-programmers) of all backgrounds. It places

a command interpreter at your disposal, building the MCI control structures and issuing commands based on simple, readable command strings. This reduces virtually any MCI command to a one-liner. Instead of loading a data structure and specifying command constants, you build a string containing a command, named parameters, and flags and pass it to the MCI through the *mciSendString* function. The MCI parses the string into data suitable for the command-message interface and sends it along. Because it's an additional layer and because string parsing is involved, the command-string interface is measurably slower than the command-message interface. But on a capable machine, that difference is usually a fraction of a second and not worth worrying about.

The command-string interface doesn't hold you back—all the status and information requests and commands that you find one level down are available here as well. In addition to turning your strings into commands, the MCI also formats returned data into strings. The command-string interface supports notification by way of a specified window handle; it lets you know when an error occurs and offers you a description of the error.

To save you even more time, the MCI provides shortcuts for those things that you might do often. You can open, play, and close a digital audio file with one command. You can also use the *mciExecute* command to make a simple call that returns no data and leaves error handling in the hands of the MCI. The simplest MCI command-string-interface call looks like this: *mciExecute* ("PLAY BERMUDA.WAV"). If the file doesn't exist or if other errors occur, the MCI will automatically pop up a dialog box describing the error—your application need not lift a finger.

Building multimedia Windows applications doesn't take much. In C or C++, it takes one header file and one import library. These are included in Microsoft's Multimedia Developer's Kit and are part of Microsoft's new C/C++ 7.0. In other environments (e.g., Asymetrix Toolbook and Visual Basic), you either use vendor-supplied add-on support or manually declare the DLL functions you intend to use. If you choose to do it yourself, the *mciSendString* function may be the only one you need to declare. Microsoft's Professional Toolkit for Visual Basic includes packaged support for the Extensions (see "Power Tools for Visual Basic," August BYTE). To prepare for this article, I used the Professional Toolkit to create two multimedia applications: a wave/MIDI file player (see the screen) and a CD player. The programs came together quickly. I

## Add Multimedia Video to your Personal Computer

Ten boards to match every need for your PC and PS/2. All run under MS Windows 3.1, MCI, MS DOS 5.0, or OS/2 2.0

- Super VideoWindows lets you display full motion video with stereo audio. Capture professional quality images in most popular file formats.
- Optional add-on's let you watch TV on your PC or merge video with VGA graphics/text.
- JPEG/MPEG options capture clips of video/audio to hard disk for playback on demand.
- Supported by leading multimedia applications and tools.

**New Media Graphics Corp.**  
780 Boston Road, Billerica, MA 01821-5925  
Tel. 508 663-0666 • Fax. 508 663-6678  
**1-800-288-2207**

★ ★ ★ AWARDS ★ ★ ★

- **Readers Choice Award**  
*MPC World*
- **1992 Readers Choice Award**  
*Presentation Products*
- **1992 Top 100 Award**  
*Windows Magazine*
- **Authoring Shootout-Winning Team**  
*PC Weeks Lab*
- **Excellently Cool Device Award**  
*Computer Shopper*
- **1992 Best Product Award**  
*MicroVision Annual Distribution Summit*



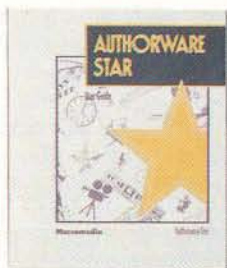
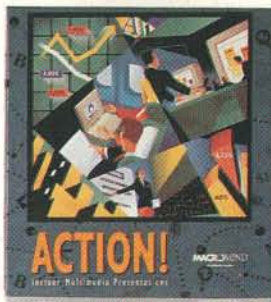
# The Sound Choice In Multimedia Upgrade Kits.



If upgrading your PC to MPC standards sounds good to you, we can make it sound even better. With a multimedia upgrade kit from Creative Labs.

For only \$799, you get the only multimedia upgrade kit with Sound Blaster™ Pro, winner of the MULTIMEDIA WORLD Readers' Choice Award for "Best Sound Board." Experience true-to-life 8-bit stereo audio effects from applications and games. With MIDI adapter cable and sequencing software, plus a 20-voice, 4-operator FM music synthesizer, Sound Blaster Pro is one sound investment!

And that's only the beginning. There's a high-performance CD-ROM drive that surpasses MPC specifications. Plus a FREE library of CDs that will open your PC to all the possibilities of multimedia computing. Over \$3,000 worth of the hottest CD titles for multimedia authoring and enhanced education, entertainment, and



productivity capabilities for your computer.

You get Microsoft® Windows™ 3.1, Microsoft Bookshelf®, a reference resource with an encyclopedia, thesaurus, and dictionary. Microsoft Works for Windows™, an integrated productivity package. MacroMind® Action!™, Authorware® Star™ and Tempra™ from Mathematica, presentation tools for DOS and Windows. Sherlock Holmes, Consulting Detective, the award-winning mystery game. And many, many more.

The Sound Blaster Multimedia Upgrade Kit. At only \$799! To find out more, visit your computer retailer or call Creative Labs at 1-800-998-LABS.

And see why choosing our multimedia upgrade kit is the most sound decision you'll ever make.



Sound Blaster is a trademark of Creative Labs, Inc.  
All other marks are owned by their respective companies. © 1992 Creative Labs, Inc. All rights reserved.  
International inquiries: Creative Technology, Ltd., Singapore Tel 65-773-0233 Fax 65-773-0353

**CREATIVE**  
CREATIVE LABS, INC.

Circle 142 on Inquiry Card.

# Plug-and-Play TCP/IP for Windows



NO other product matches the simplicity and rich features of *Super-TCP for Windows*. Find out why the press calls it the "Swiss army knife" of Windows networking. Act now to buy the best value TCP/IP product!

### Standard Features:

- 100% Windows DLL
- Windows Sockets API
- FTP, TFTP
- VT220, VT100, tn3270
- SMTP, POP 2/3 Email
- LPR Printing
- SNMP
- Talk
- And Much More!

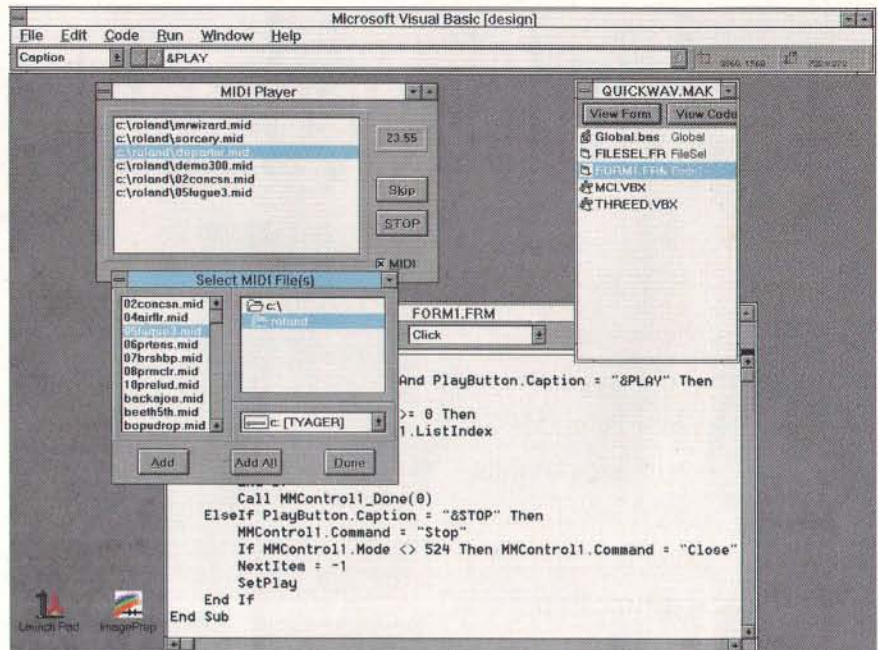
### Options:

- NFS
- LPD Server
- X.25
- NetBIOS
- PPP
- OSI/GOSIP

Call your nearest reseller or Frontier for more information or your free demo:

**Frontier Technologies Corporation** 

10201 N. Port Washington Rd.  
Mequon, WI 53092  
TEL: 414 241-4555  
FAX: 414 241-7084



*My wave/MIDI file player, one of two Visual Basic programs developed for this article. Microsoft's MCI makes quick work of building Windows multimedia applications in any language.*

spent more time making the interfaces attractive than getting the multimedia aspect right.

The CD player was easy to create because the Visual Basic custom control that handles the MCI is a row of pushbuttons like those found in the media player. By default, the buttons' behavior is tied to the actions that their bit-mapped faces represent. Pushing on the play button sends a play command to the open MCI device. All I had to do was wire in some feedback and build in a repeat feature.

The feedback proved to be a bit of a challenge. The idea was to periodically poll the CD audio MCI device for its position and display that information in a special field. The MCI will let you pass and receive position values in a number of formats, including one that's perfect for CD audio (i.e., track, minutes, seconds, and frames). Unfortunately, the Professional Toolkit returns this data packed in a 32-bit integer. Visual Basic lacks the bit-shifting operators that would have made quick work of dissecting this value. Instead, I had to divide an expensive operation for an interpreted language.

It turned out fine, but perhaps only because I have a fast system and decipher the time value just once per second. Microsoft thoughtfully added an automatic timer to the MCI control, which dispatches status events at tunable intervals. I didn't have to build delay loops into my program

or use a separate timer control to keep the feedback display updated.

The wave/MIDI player came together quickly. These projects reinforced what I had known all along: Microsoft deserves a lot of credit for its design of the Extensions and, more specifically, of the MCI. The device-independent nature of the Extensions leaves unlimited room for future enhancements, and vendors are already stepping up to the plate.

### Tip of the Iceberg

What you've just read of the Extensions is only the tip of the iceberg. Its true value lies in its role as a foundation for future development. Already, there are extensions popping up, including support for Intel/IBM's ActionMedia II digital video board and software. Microsoft wisely made its extensions easy to access from applications. It's so effortless; even applications that aren't multimedia-centric will take on multimedia capabilities simply because the Extensions are so easy to use. Besides, once people get used to them, support will become a checklist item for future Windows programs. ■

*Tom Yager is director of the BYTE Multimedia Lab and author of Multimedia Producer's Handbook (Academic Press, forthcoming). You can reach him on BIX as "tyager" and on the Internet at tyager@bytepb.byte.com.*

Are you creating illustrations, graphics, single-page designs or any other artwork using Windows™? Then you'll be glad to know

there's a more precise, more productive and more powerful illustration program available. Adobe Illustrator™ 4.0 software for the Windows environment. The complete design tool for professionals.

"For professionals, Illustrator 4.0 for Windows is an exceptional do-it-all application..." *InfoWorld*, 1992.

The program that provides precision control over all aspects of the creative process. You can

draw smooth Bézier curves, lines and objects, then add text in ways never before possible with other programs. Adobe Illustrator 4.0 for Windows offers:

- Precision control
- Unsurpassed text features
- Professional color capabilities
- Reliable, high quality output
- High-speed performance

The package includes Adobe Illustrator, Adobe Type Manager™, Adobe™ TypeAlign™ and Adobe Separator™ software, plus 40 typefaces from the Adobe Type Library, a selection of

predrawn artwork and a lot more. So call us at 1-800-833-6687, dept. K, ext. 0147. And get all the details on Adobe Illustrator 4.0 for Windows. Or simply ask for your nearest dealer. Then, take Adobe Illustrator on a test drive. And while you're at it, throw us a few curves. We can handle them better than anyone.

**\$199**

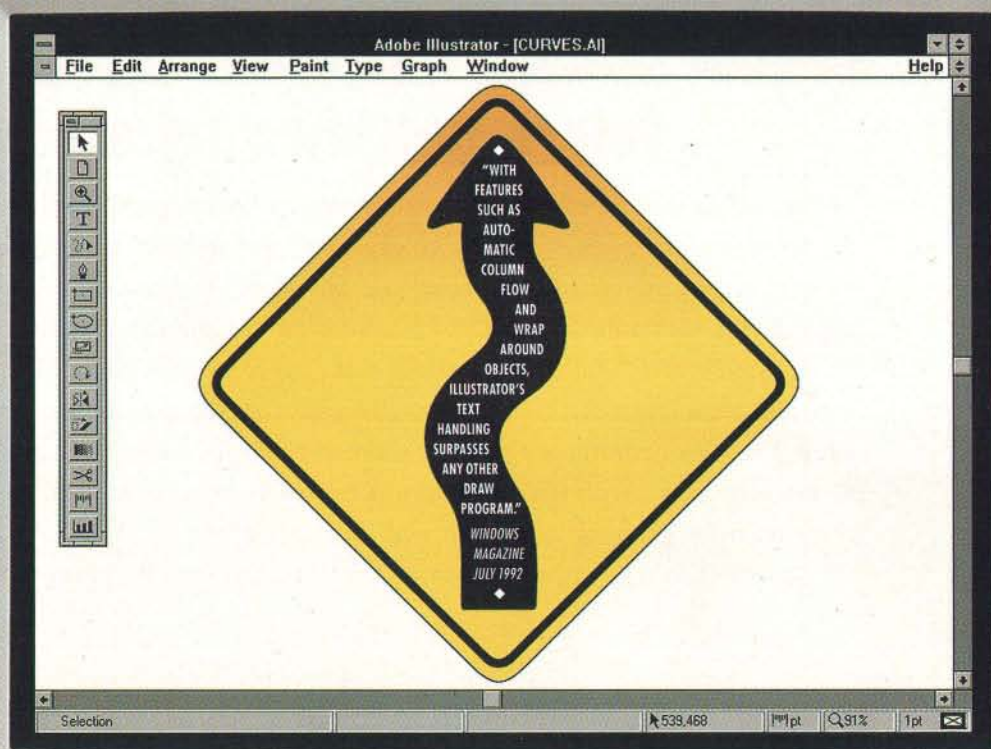
Upgrade from another drawing program and get Adobe Streamline 3.0™ free. See details.\*

\*Receive Adobe Streamline™ 3.0 software free of charge when your reseller returns a card to Adobe Systems indicating that you have purchased a competitive upgrade to Adobe Illustrator. Competitive products included in this special offer are CorelDRAW!®, Micrografx Designer™, Arts & Letters Graphics Editor, Aldus FreeHand® for Windows, Harvard Draw and Artline. Offer expires December 31, 1992.



Circle 63 on Inquiry Card.

# Nothing handles the curves better than Adobe Illustrator 4.0 for Windows.



Adobe, the Adobe logo, Adobe Separator, Adobe Streamline, Adobe Type Manager, the Adobe Illustrator logo and TypeAlign are trademarks of Adobe Systems, Incorporated which may be registered in certain jurisdictions. Windows is a trademark of Microsoft Corporation. Aldus FreeHand is a registered trademark of Aldus Corporation. Micrografx Designer is a trademark of Micrografx, Inc. CorelDRAW! is a registered trademark of Corel Systems. All other brand or product names are trademarks or registered trademarks of their respective holders. Copyright © 1992, Adobe Systems Incorporated. All rights reserved.



**Computers and Communications.**  
*Multimedia isn't the only way to get attention. NEC has put C&C to work in a wide variety of products. Making it easier for you to communicate at home, in business, or around the world.*



## You're getting very sleepy.

Snap out of it. Nobody wants to sit through a boring presentation. Today's audiences expect communications to include color, sound and motion. And you can give it to them.

If you've got a PC\*, all you need is an NEC MultiSync® FG™ monitor, and an NEC Multimedia Upgrade Kit with InterSect™ CD-ROM reader for the ultimate Multimedia system.

Our MultiSync FG series of monitors make everyone look good. Big screens—15", 17" and 21"\*\*\*—provide a larger display area and give you more room to show off. High resolution and superior display performance produce sharper, brighter images from edge to edge. And only FG monitors come with the AccuColor† Control System, so you can manipulate on-screen color for truer graphics and more realistic flesh tones.

If you want to take ordinary communications and turn them into a creative display of



## Consider this your wake up call.

video, animation and sound, try our Multimedia Upgrade Kit with CD-ROM reader. Our desktop CDR-74 and internal CDR-84 readers include NEC's unique MultiSpin™ technology. Making them the fastest readers in the world. And our portable CDR-37 is a great way to take your show on the road.

What's more, they all exceed Multimedia PC standards, are Photo CD capable† and QuickTime™ compatible.

And with our Multimedia Upgrade Kit you not only get the InterSect CD-ROM reader of your choice, but an audio board, Microsoft® Windows™ 3.1, Asymetrix® Multimedia Toolbook®, stereo headphones and speakers, and a microphone.

For more information call 1-800-NEC-INFO. You've slept through too much already.



Because ↑ is the way you want to go.

# NEC

**NEW!**  
Object-Oriented Option.  
"Coad/Yourdon" & "Grady Booch 91+"



# System Architect kicks into overdrive: Today's Price/Performance CASE Leader Now Offers Schema Generation.

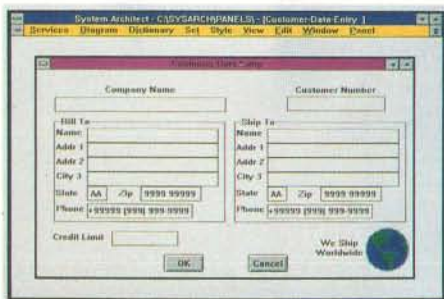
Now you can build applications even faster with System Architect's new database Schema Generator. And System Architect is so easy to use, even beginners will be productive in no time.

## NEW: Schema Generator.

Translate entity models, captured in our encyclopedia, into schema for DB2, Oracle, INGRES, SQL Server, RDB, Progress, Paradox, SQL Base, AS400 (SQL), XDB, Sybase, and Informix. Generate data definitions for C or COBOL programs. And create Windows user dialogue panels.

## NEW: Screen Painter. (Call for availability.)

Develop screens for Windows, Presentation Manager, or character-based applications. The screens you create are then linked to our encyclopedia.



Paint GUI screens.

## Multiple Methodology Support.

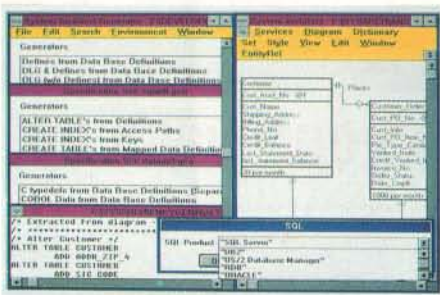
Work with such methodologies as DeMarco/Yourdon, Gane & Sarson, Ward & Mellor (real-time), Entity Relation diagrams, Decomposition diagrams, Object Oriented Design (optional), State Transition diagrams, Flow Charts and SSADM.

## Integrated Data Dictionary/ Encyclopedia.

Customize your own data dictionary/encyclopedia, and get multi-user support with and without a network.

## Advanced Features.

Take advantage of normalization, rules & balancing, requirements traceability, a network version, import/export capabilities, custom reporting, an extendable data dictionary, auto leveling, CRUD Matrices, and automated documentation (enhanced 2167A -- call for availability).

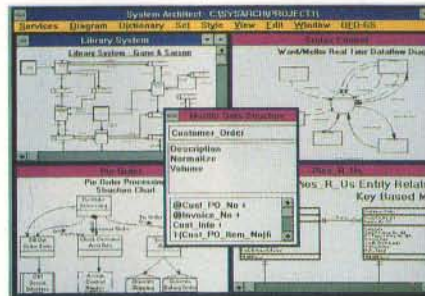


Generate schema from entity diagrams.

## A Proven CASE Product.

IEEE Software Magazine called System Architect "a useful, well-planned, affordable CASE tool." CASE Trends found System Architect "to be extremely easy to use. . . with many features that are completely lacking in higher priced competitors." Toshiba said "System Architect stood out from many other prospects." And System Builder

called System Architect "truly a price/performance leader."



View data models, DFDs, and structure charts simultaneously.

## Works under Windows 3 or OS/2 Presentation Manager.

You get full functionality in each environment.

## Affordable.

System Architect costs from one half to one fifth the price of comparable CASE products.

**FOR THE REAL-WORLD  
CASE SOLUTION, CALL  
(212) 571-3434 TODAY.\***

**POPKIN**  
Software & Systems Inc.  
11 Park Place, NY, NY 10007  
Tel: (212) 571-3434  
Fax: (212) 571-3436



## Supporting IBM's AD/Cycle

System Architect logo is a trademark of Popkin Software & Systems Incorporated. Other product names used herein are for identification purposes only and may be trademarks of their respective companies. Specifications subject to change without notice at the sole discretion of the company. Product delivery subject to availability.

\*Worldwide sales: Italy 39-49-8700366; Germany 49-(0)6151-82077; Sweden 46-8-(0)626-8100; Benelux: 31-(0)3406-65530; England 44-(0)926-881186; Elsewhere 1(212)571-3434





# How OLE Works

It's not as easy to use as advertised

BARRY NANCE

According to Microsoft, OLE is supposed to enable different applications to communicate and share information. OLE doesn't replace DDE, however; its purpose is to make interapplication data transfer easier to manage.

With OLE, you create documents that contain other documents, either by reference (*linking*) or directly (*embedding*); a copy of the additional document resides in the main document (see the figure). You can also combine information from several applications into a single document. You still use different software to edit or update the objects you link or embed, but OLE saves you from having to recopy and repaste the data each time you make a change; OLE invokes the appropriate application automatically for you.

In addition to exploring OLE from a user's viewpoint, I wanted to find out how OLE might fare in the real world. If OLE is as useful as it sounds, it would give me the ability to let Borland, Microsoft, and Lotus products talk to each other easily and productively. The text box "Putting OLE-Aware Applications to Work" on page 50 describes the varying degrees of success I had connecting these programs with OLE.

## Exploring OLE

OLE lets you create a document, spreadsheet, database, or other data structure in which various parts are owned, edited, and updated by different applications. One application is responsible for the overall structure; individual applications participate by owning sections of the structure. Once you've created a link or embedded something, you can double-click on the section to invoke the application responsible for that section. The update occurs in a window within the framework of the overall structure. The result is a *compound* document containing one or more elements from other applications. A compound document is also called a *destination document*. The original structure or document in which you create the object is called a *source document*. The screen shows how a linked or embedded object appears to an end user.

When you embed an object inside a data structure, you essentially make a copy of the original object. The copy exists inside the overall data structure. Linked objects, on the other hand, do not get copied; only a reference to the linked object exists inside the overall structure. If you update the original data, the copy automatically reflects the update via the link.

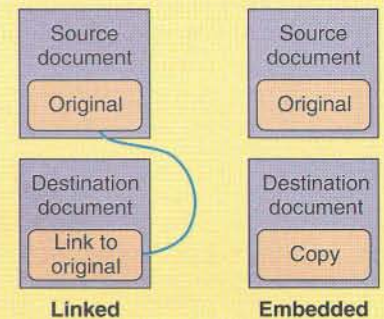
The basic user interface for creating links and embedding objects is an extension to the Edit menu's familiar Cut, Copy, and Paste operations. OLE-aware applications have a new command for the insertion of links: Paste Link. An application might also have special commands, such as Paste Special or Insert Object, to facilitate linking or embedding. Paste Special displays a dialog box in which you can specify a data type for an object—Rich Text Format, sound, or something else. Insert Object lets you embed a "blank object" of a type you specify; this then executes the appropriate application to let you edit the new object. When you choose Insert Object, you see a list of OLE-

aware applications that have registered themselves with Windows. You may even sometimes see an application that has the ability to accept OLE objects through drag-and-drop operations.

OLE objects pass through the Windows Clipboard. To embed an object, you select (with the mouse or with Shift-cursor moves) and copy the appropriate part of the source file. An instance of the object appears in the Clipboard. In the application that owns the destination document file (e.g., a spreadsheet, word processing file, or database), you use the Paste command to embed the object or the Paste Link command to link the Clipboard data. If you use Paste Link, the main file stores a reference to the original object. In applications that don't support OLE, a Paste operation inserts a static copy of the object, just as it did under earlier versions of Windows. You get the same result as with OLE, but you can't double-click on the static pasted object to bring up the original application for editing purposes.

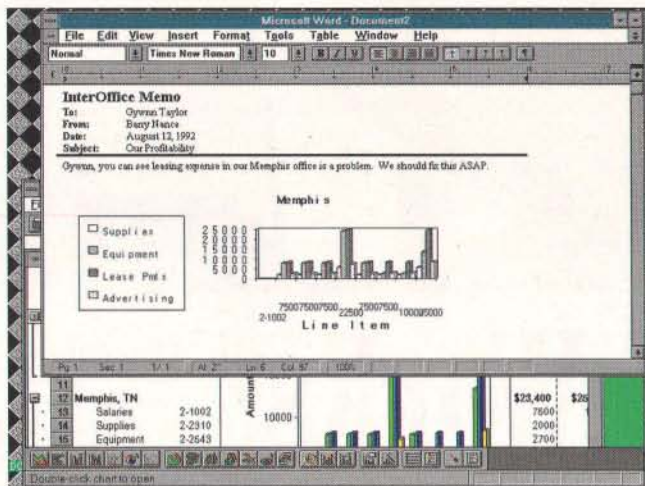
You can create links to links. For example, you might link a chart or drawing into a word processing document. You can also copy or select the linked drawing and Paste Link the object into yet a third file. The links in this case, however, do not

## LINKING VS. EMBEDDING



*A linked object has only a reference to the original object; an embedded object is a one-time copy of the original.*

How OLE appears to users. In this case, an Excel calculation rippled into a Word document, prompting the written response. OLE copied the Excel chart into the Word document. Clicking on the embedded chart runs Excel, allowing you to update the chart without leaving Word.



always update the way you'd expect. Microsoft has corrected the problem in the latest version of the OLE specification, which I'll discuss later.

### Distinguishing OLE Servers and Clients

It isn't enough to simply put "OLE awareness" on your checklist of must-have fea-

tures for the Windows software you buy. Before you spend any money, you'll want to see whether the software can be an OLE server or merely an OLE client. Which kinds of objects can you link or embed with the software? Does the application also support DDE, OLE's precursor? In some situations you may find that DDE does the job when OLE can't.

The OLE specification distinguishes between OLE servers and OLE clients. A server module can edit an OLE object, while a client can merely accept a link and display the object. Obviously, you need an OLE server to do anything with OLE; an OLE client by itself is of no use. If you plan on using OLE, you'll want to make sure the edit/update software you buy can act as an OLE server.

### Keeping Track of Links

Mainframe systems designers draw large charts to illustrate automated information flow and disk file interrelationships. These charts often cover entire walls, and the designers always have a formal plan for distributing changes to the charts to data processing operations and other personnel.

Typically, a personal computer user doesn't have to resort to this kind of system documentation. You load a file into your spreadsheet application, update the data, save the file, and perhaps export the data into another application. You probably document the export action in some sort of informal way for those days when you aren't in the office.

But when you set up OLE connections

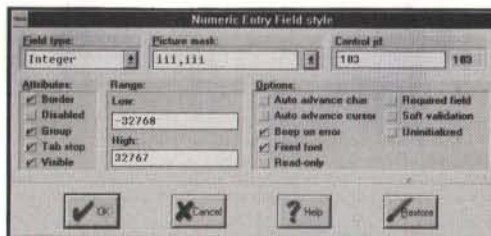
## Professional Windows Data Entry for TPW and C++

# Validated Entry Screens...Build Them Interactively!

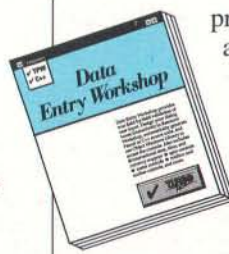
**Data Entry Workshop's** custom edit controls provide true field-by-field validation of user input for Microsoft Windows applications. It's as easy as 1-2-3:

1. Design your dialog box interactively in Resource Workshop.
2. Run MAKESRC utility to generate Pascal or C++ source code.
3. Use ObjectWindows Library to access your controls.

Use picture masks for precise control of input. Offer calculator-style editing of numeric data. Adapt easily to international differences in date, time, and currency formats. Add calculated, read-only, or required fields. Add spin controls to let users increment and decrement fields with the mouse or cursor keys. Data Entry Workshop gives you the tools you need.



Resource Workshop dialog for designing a numeric entry field.



You also get:

- Meter controls for use in installation programs.
- Toolbox and toolbar controls to give your users one-click access to common commands.

### Full Source and Great Support

Data Entry Workshop includes comprehensive printed documentation, plenty of working example programs, and support direct from the authors. Full source code is included (DLLs are in Pascal). You pay no royalties.

**Data Entry Workshop, only \$189.**

Call toll-free to order.  
**1-800-333-4160**

DEW requires TPW 1.5 or later, BC++ 3.0 or later, or TC++ Win 3.0 or later, RW 1.02 or later, and OWL. Satisfaction guaranteed or your money back within 30 days. Includes dual media. Add \$10 per order for shipping in US and Canada, add \$20 per item for international airmail. Owners of TurboPower DOS products may purchase DEW for \$109 until 10/30/92.



9AM - 5PM MST Monday through Friday, U.S. and Canada. For more information call (800) 333-4160, fax to (719) 260-7151, or send mail to CompuServe ID 76004,2611. Int'l orders (719) 260-9136. TurboPower Software PO Box 49009 Colorado Springs, CO 80949-9009 © TurboPower Software, 1992

# The Monitors for Windows

The ViewSonic 7 was the original, "Big Screen for Windows" monitor. Here's what some editors said about it:

*Byte (May 1992)* "... The ViewSonic 7 gets our vote as the best overall monitor".

*Windows Magazine (May 1992)* "... The ViewSonic 7 is the best value in the test".

*Infoworld (Sept 1991)* "... The ViewSonic 7 captured the top spot in our tests".

## Introducing the NEW 14" ViewSonic 5E and the 15" ViewSonic 6FS.

The best of both worlds ... ideal Windows monitors to fit the size and budget requirements of every customer.

## Now you have a choice.

These three great non-interlaced monitors have a lot in common, including minimum 72Hz refresh rate at 1,024 x 768 resolution. That's flicker free. Plus they're multi-scanning and have a non-glare screen.

The 15" and 17" monitors feature a flat square screen along with digital controls for programmable screen adjustments. To help maintain a safer environment, both are MPR-II certified for low radiation.

For the monitor that's best for Windows, make it a ViewSonic — the monitor of choice. And you have a choice of three!

## ViewSonic®

20480 E. Business Parkway  
Walnut, CA 91789  
(714) 869-7976 (800) 888-8583  
FAX (714) 869-7958

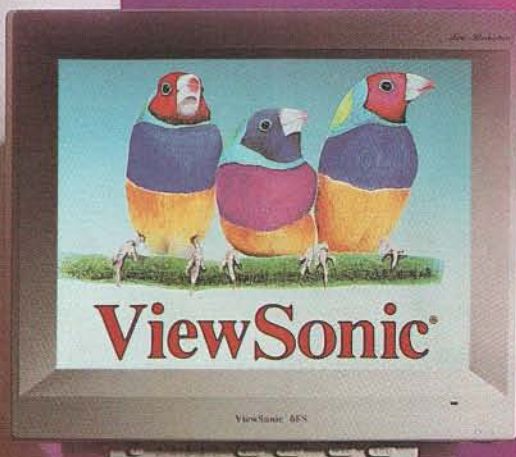
All products and brand names are trademarks of their respective companies.

Circle 135 on Inquiry Card (RESELLERS: 136).

COMPACT 14" ViewSonic 5E



MID RANGE 15" ViewSonic 6FS



FULL SIZE 17" ViewSonic 7



between files, you need to borrow some of the techniques of the mainframe systems designers. You need to document the data dependencies you've expressed in the OLE connections so other users will be aware of them. And, naturally, you need to keep the documentation up to date.

A description for an OLE connection might consist of a set of comments you place in a spreadsheet, or perhaps some hidden (i.e., nonprinting) text that you insert into a word processing file. The doc-

umentation you maintain should include the name of the source file, a description of the object, the type of connection (i.e., linked or embedded), and whatever other information you can use to tell yourself or others about the connection.

A few months after you create the OLE connection, you or a colleague will probably need to make changes to it. If people forget the connection exists, confusion and frustration may cause someone to erase the files and force you to start the entire

project all over again. An organized, methodical approach to your use of OLE will make OLE effective and useful in your office. To help you keep track of linkages, some advanced applications have a Links menu item (under the File selection) that lists the source files for any links in the file you're editing.

**Discovering OLE's Shortcomings**

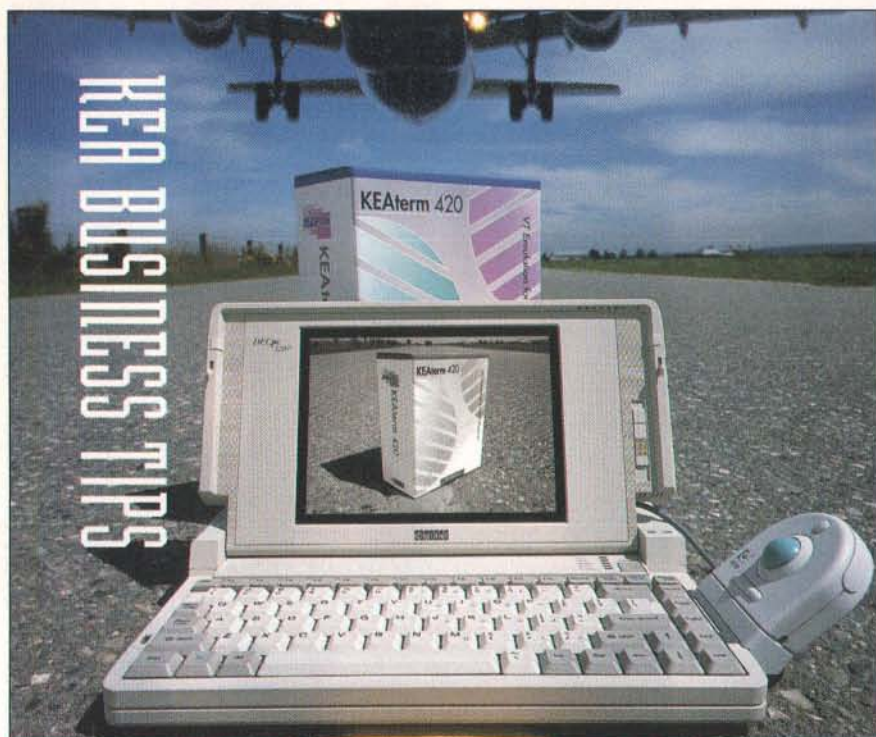
Keeping track of the links in a file is a minor chore, but, as with any new technology, you'll run into a few problems as you use OLE. The increase in the sizes of disk files that contain embedded objects is usually a manageable problem, but OLE's memory usage is a more difficult issue to overcome. The Clipboard and the OLE mechanism in general can handle only so much data. Linking or embedding large objects can result in out-of-memory error messages from Windows. Inadvertently deleting a source document file confuses OLE when links to that file exist; you'll get "File Not Found" error messages when OLE attempts to refresh the destination document file data.

When using OLE, you'll find that you want it to do things that it can't. "DDE offers an Execute option that you can use to invoke operations in other applications, and this option works well. OLE is less useful in this area," says Anders Vinberg, vice president of Computer Associates. Even when using Visual Basic and the Professional Toolkit for Visual Basic to create your own OLE client module, you'll likely get frustrated. OLE is nonintuitive to understand and program for.

Despite the "object" in its name, OLE doesn't support *inheritance*: the creation of another object, as a subclass of the original, whose behavior is governed by selected attributes and characteristics of the original. OLE also needs to support the negotiation of object size and object-handling capabilities between client and server modules. OLE can carry raw data (e.g., spreadsheet cell values), but it can't yet transfer column widths and some other formatting options. For example, if you perform a global font change in the source document file, OLE does not ripple the changes into a linked destination document.

OLE is not an efficient mechanism, according to Rob Dickerson of Borland International. You'll pay a penalty in slower performance if OLE connections are active while you use your computer. OLE isn't the sort of link you'd use to exchange data across even high-bandwidth data communications lines.

Nonetheless, Dickerson believes OLE is a good way to sidestep some of the limitations of DOS. OLE bypasses the usual



**Tip #1: Travel Digital Style!**

**W**hen it comes to terminals, the folks at Digital Equipment know the real McCoy. After all, they invented VT terminals. But they know a real VT terminal isn't ideal for every situation. That's why they chose KEAterm 420 for their field account teams.

The perfect partner for Digital's notebook—KEAterm gives the power of Windows to host applications. Run multiple VT sessions and other Windows applications—like Excel, Lotus 1-2-3, Word or WordPerfect—each in its own window.

Digital's field account representatives use KEAterm on their DEC notebook PCs. You can use KEAterm for Windows on your notebook or your office PC. And if you're a DOS user, KEA supplies ZSTEM VT320/340 emulation. **Preview KEAterm 340 for Windows at Networkworld in Dallas, 13-15 October.**

The Digital team knows what travels best. And they know a good VT emulator when they use one. Find out why thousands of Digital's account representatives are KEAterm users.



**KEA Systems Ltd.**

**Orders: 1-800-663-8702**

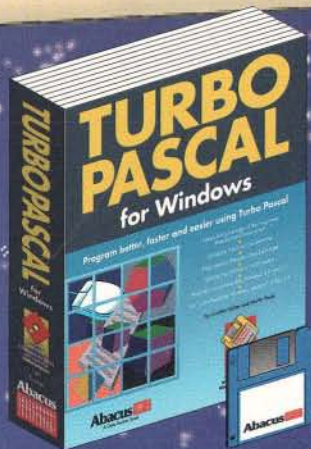
**Phone: (604) 431-0727**

**Fax: (604) 431-0818**

KEA Systems Ltd. 3738 North Fraser Way, Unit 101, Burnaby, BC, Canada V5J 5G1 KEALink, KEAterm, ZSTEM, PowerStation, KEA and their respective product logos are trademarks of KEA Systems Ltd. All other brand or product names are trademarks or registered trademarks of their respective holders. Copyright © KEA SYSTEMS LTD. 1992. All rights reserved.

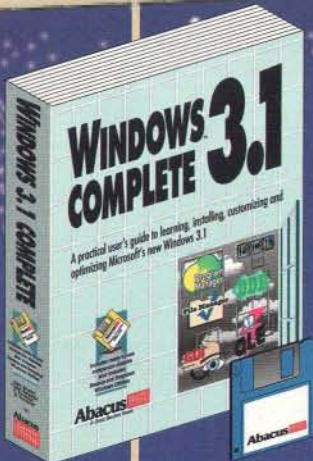
# WINDOWS EXPOSED!

Whether you're a beginner, an expert or just plain  
**Crazy About Windows!**



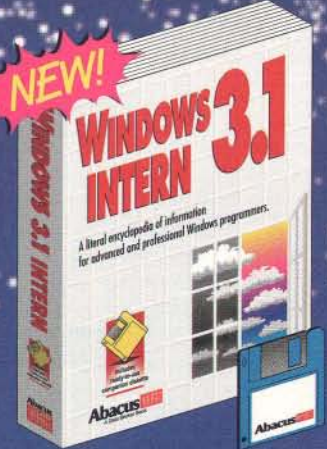
## Turbo Pascal for Windows

It's the complete guide to using Turbo Pascal under Windows. Includes an extensive intro to the integrated development environment, a practical overview of the fundamentals and special features of Pascal programming under Windows. Also includes an introduction to the Unit Concept that's vital to understanding object oriented programming. Order Item # B141. ISBN 1-55755-141-3. \$39.95. With 3 1/2" companion disk.



## Windows 3.1 Complete

An in-depth practical guide to Windows 3.1 environment from installation through detailed customization. Explains how to maximize your productivity by using Windows SETUP and memory management facilities, easily exchange data between applications using the clipboard and the new DDE and OLE. Includes useful information and time-saving tips that you won't find in your Windows reference manual. Includes two Windows utilities - Backup (backup your valuable data) and Snapshot, a screen grabber. With 3 1/2" companion disk. Item #B153 ISBN 1-55755-153-7. \$34.95



## Windows 3.1 Intern

Teaches the reader Windows programming and events using dozens of easy to follow examples. It's a solid guide for intermediate to advanced Windows programmers. Includes Windows message system, text and graphics output, bitmaps, file management, Windows help system, MDI, DLL, TrueType fonts, memory allocation, Windows API, Object Linking and Embedding (OLE) and much, much more. Item #B159. ISBN 1-55755-159-6. \$49.95 With 3 1/2" companion diskette.



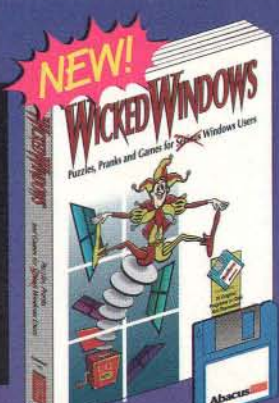
Special Software Offer Only \$79.95

## BeckerTools Version 3.0 Software

BeckerTools is a deep toolbox full of powerful file and data management utilities for every Windows user. Dozens of essential functions are right at your fingertips - all ready to use at the click of a mouse button. If you use Windows and want to work faster, easier, smarter and more efficiently, you'll appreciate the large collection of utilities we've packed into BeckerTools. Work Easier - BeckerTools is fast, easy and convenient. Work Faster - BeckerTools' advanced features help you get the job done fast! System requirements; IBM 100% compatible XT, AT, 386 or 486. Microsoft DOS 3.2 or higher, hard disk and Windows 3.X. Item #S161. ISBN 1-55755-161-8. Suggested retail price \$129.95

## Wicked Windows

is a myriad collection of some of the funniest, wackiest and wicked Windows pranks, puzzles, toys and games for all Windows users. All programs in the book are on the diskette and are ORIGINAL, not shareware. That means no hidden fees or costs to use them! Item #B162. ISBN 1-55755-162-6. \$19.95 With 3 1/2" companion disk.



**Abacus**

Dept. BW, 5370 52nd Street SE, Grand Rapids, MI 49512  
Phone: (616) 698-0330 • Fax: (616) 698-0325

**Order Toll Free  
1-800-451-4319**

Available at B. Dalton, Book Star, Book Stop, Barnes & Noble, Crown Books, Software etc, Waldensoftware, Computer City, and other retailers nationwide. In the UK call Computer Bookshops 021-706-1188. In Australia call Pactorics 02-748-4700.

Circle 61 on Inquiry Card (RESELLERS: 62).

- Please rush me the following:
- Turbo Pascal for Windows. .... \$39.95 ea.
  - Windows 3.1 Complete ..... \$34.95 ea.
  - Windows 3.1 Intern ..... \$49.95 ea.
  - BeckerTools V3 ..... \$79.95 ea.
  - Wicked Windows ..... \$19.95 ea.

Subtotal: \_\_\_\_\_  
CA & MI orders include correct sales tax: \_\_\_\_\_  
In US & Canada add \$5.00 shipping: \_\_\_\_\_  
Foreign orders add \$13.00 per item: \_\_\_\_\_  
Total amount (US funds): \_\_\_\_\_



For fast delivery Order Toll Free 1-800-451-4319 ext. 223, or FAX (616) 698-0325  
Or mail this coupon to: Abacus, 5370 52nd Street SE, Grand Rapids, MI 49512

Method of Payment:  Visa  Master Card  Am. Express  Check / M.O.

Card#: \_\_\_\_\_ Expires: \_\_\_\_/\_\_\_\_/\_\_\_\_

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone#: \_\_\_\_\_ Fax#: \_\_\_\_\_

Yes, please rush your free catalog of PC books and software.

Dept. BW

DOS file-storage conventions, so you don't have to think in terms of 11-character filenames as you use OLE; you can identify your OLE connections with more meaningful names. OLE also enables you to think of the work you do on your computer in terms of a document model rather than an application model. Dickerson says that technologies like OLE will enable us to become *document-centric* instead

of *application-centric*.

The biggest problem with OLE on a network is that it doesn't do a good job of helping you share data among workstations. The Windows Clipboard, the vehicle that OLE uses for data exchange, doesn't operate across a LAN. You can't, for example, copy an area of a document and then tell someone else on the network that it's now available for linking. You'd think

you could at least embed an object in a file, store the file on the server, and make the file available to other people. In practice, though, this doesn't work very well. Both the OLE server module and client module must exist on the file server in the same directories for both workstations. Two workstations can't have the same compound document file open at the same time. *continued*

## PUTTING OLE-AWARE APPLICATIONS TO WORK

To evaluate the merits of OLE in Windows 3.1, I used some shrink-wrapped applications from a variety of vendors. These applications consisted of Microsoft's Excel 4.0, Word for Windows 2.0, Publisher 1.0, and Works 2.0; a beta version of Borland's Paradox for Windows; Borland's ObjectVision 2.0; and Lotus's Ami Pro 2.0 and Notes 2.1.

Additionally, I used Microsoft's Visual Basic to find out how to program my own OLE links. You'd want to do this to help integrate office-automation tasks in your company when standard shrink-wrapped applications don't quite give you what you need.

### The Bookstore Manager

As manager of an imaginary retail bookstore, I used my set of OLE-aware applications to try to automate many of my store's functions. I forced myself to forget that I'm a programmer; I wanted to see how I could put shrink-wrapped software to work without resorting to designing and coding the application myself in C or Pascal. I tried to create an environment that would let the applications work together—through OLE—as I sold books to customers.

The first thing I needed was a cash register. I used Visual Basic to construct a simple cash-register interface, with menu items for enabling (at the start of the day) and disabling (at closing time) the OLE links. It only took about an hour with Visual Basic to create the cash register itself. The OLE connections, however, took a couple of days; Visual Basic programs can be only OLE clients, not servers, and I had to work around the inability of the Visual Basic application to edit and update a source document file. I could have written a DLL in C that allowed the cash register to be an OLE server, but I was a store man-

ager, not a programmer.

The data I wanted to share among the applications consisted merely of sales transactions that originated in the cash-register function. By recording stock numbers (i.e., the ISBN for each book) and prices, I hoped to feed the financial data into Excel and the sales data into Paradox. Excel would show whether I made a profit, and Paradox would keep track of my inventory (by ISBN). I also wanted to use the information to produce customer follow-up letters in either Word for Windows or Ami Pro. Microsoft Publisher would prepare my storewide best-seller list.

In Paradox for Windows, you designate the data type for each field in a table. One of the available data types is "OLE," meaning that the data really exists somewhere else and is maintained by an OLE server. A field of type OLE can't be a key in the table, so I had to generate a unique sequence number in Paradox to act as a record key for each sales transaction. My roster of fields included the sequence number plus the OLE-linked ISBN and price information from the cash register. The same linked fields would flow into Excel. In both cases, each data field became a separately linked item to OLE; I couldn't get the items to flow through OLE as a group (i.e., as a single record).

Most bookstores are part of nationwide chains these days. I wanted to use Lotus Notes as the vehicle for communicating my sales data back to national headquarters. Why not use OLE to give headquarters exactly the same data I captured at the cash register? Granted, I should have done my design first and then purchased the software. But people often use the software they have at hand to accomplish tasks. I'm confident that I'm not the first person—nor the last—to put shrink-wrapped software to

work in unusual ways.

After some attempts at finagling the Visual Basic OLE client software (the cash register) into feeding data to Excel and Paradox, I gave up and used DDE links instead. DDE proved to be much better at exchanging data among the applications. Paradox for Windows and Excel became DDE clients, and the Visual Basic cash-register application became a DDE server—a role it couldn't play under OLE.

Once I recorded the sales transactions in a database and a spreadsheet, I found that OLE wouldn't let me transfer the DDE-linked data into Publisher, Notes, Word for Windows, Works, ObjectVision, or Ami Pro. OLE will link to "real" data in a source document, but not to DDE-linked data. The designers of OLE must not have taken the possibility of an extra level of indirection into account. So it was back to the drawing board.

I told Excel, through a formula consisting of a simple reference to the set of cells, to reflect the incoming data as new values elsewhere in the spreadsheet. This approach caused "real" data to exist in the spreadsheet, and I could use OLE to create connections between the data and the other applications. The rest of the project became a series of straightforward tasks to create the form letters, best-seller-list page layout, and other output documents I wanted to automate. And, of course, I reminded myself I should someday take the time to document the linkages I had created.

With this bookstore automation effort, I discovered OLE isn't quite as easy to use or as universal a tool as I had hoped. In your own work, you'll probably want to wait until Visual Basic and other Windows software comply with the OLE 2.0 specification before you spend a lot of time trying to create significant OLE-aware systems.

# SHOULD A WINDOWS DATABASE BE EASY, RELATIONAL OR COMPATIBLE?

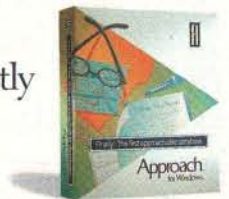
Approach™ for Windows™. It's the only database that gives you ease. Relational power. And compatibility. All in the same box. Which is why it's become the best-selling Windows database almost overnight.

At the same time, it has so much **relational** power you can run your entire business on it.

Technology, you can work with dBASE®, Paradox®, and Oracle® SQL data in its native format. And even mix data from all three on the same form or report. It's also plug-and-play compatible with any Novell®, Banyan®, Microsoft® or LANtastic® network.

## ABSOLUTELY.

So if you're waiting for the database of the 90s, we'd like to leave you with exactly one thought. It's here.



**APPROACH FOR WINDOWS**  
Approachable. Relational. Compatible.



**APPROACH**  
SOFTWARE CORPORATION

For information, or to order, call your local dealer or  
**1-800-APPROACH.**

**Winner**



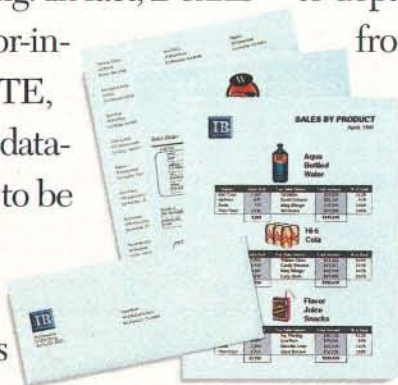
Approach for Windows wasn't just the best database at COMDEX/Spring 1992. It was the best software. Period.

And why it was named best software at COMDEX/Spring 1992.

It's so **easy**, you can build and manage a

database with absolutely no programming. In fact, Dennis Allen, Editor-in-Chief of BYTE, said "Every database claims to be easy to use.

Approach for Windows really is."



Even new users can generate reports, forms, and mailing labels like these. By using a mouse instead of a manual.

From contact management to department budgeting; from processing accounts receivable to analyzing and reporting on corporate data. We even made it 100% **compatible** with all your network data. With our PowerKey™



GraphicsENGINE 32:

# Windows Users...

# 20X

Faster Windows!

Now Only

# \$189

Thru Dec 31 '92  
reg. \$229

- Faster Windowing
- Speed Scrolling
- Quick Page Graphics
- 16.7 Million Colors

## Quality Graphic Accelerators

- High Performance Windows and CAD applications
- 72HZ Refresh Rate for Flicker-Free screen capabilities
- One-year repair/replace policy



**Order Now!**

Government and  
Corporate PO's welcome.  
VISA or MASTERCARD

# 800 927 5557

## OLE-AWARE SOFTWARE PRODUCTS

*This list is complete as of this writing; other companies may also introduce OLE-aware products this year.*

Company	Product	Client/Server
Aldus	PageMaker	Client
Borland	ObjectVision	Client
Borland	Paradox for Windows	Client
Computer Associates	CA-Compete*	Server
Computer Associates	CA-dBFast*	Client
Coromandel	Integra SQL*	Client
DesignView	ComputerVision	Server
Gupta Technologies	SQLBase*	Client
Gupta Technologies	Quest*	Client
Lotus	Ami Pro	Server
Lotus	Notes	Client
Microsoft	Excel	Server
Microsoft	Word for Windows	Server
Microsoft	Publisher	Client
Microsoft	Works	Client
Microsoft	PowerPoint	Client
NewQuest Technologies	Ascend for Windows	Client
Ventura Software	Ventura Publisher	Client

\* Company says the product will be OLE-aware sometime in 1992.

### Examining OLE 2.0

Microsoft has just released a new version of the OLE specification for programmers to use. It'll probably be a year or so before you see software products that incorporate the new 2.0 specification. Many of the changes are invisible to the end user; they will simply make OLE easier to program.

One of the changes that you will notice, however, permits a secondary link to refer to an embedded object. When you edit the embedded object, the link will update the secondary destination document file. Another change that will make OLE easier to use is better storage management. You will encounter fewer memory-error messages with version 2.0. You will also get more predictable behavior when two or more server modules attempt to edit the same object at the same time.

The most visible change with OLE 2.0, however, occurs with "in-place interaction." If both client and server modules support this feature, you'll be able to use the Open menu item to create a window in which you can edit an object. You'll get more display space and control tools for performing the update. When you activate an object, the menus and tools will change to reflect what's appropriate for the object. And you won't get so confused about how to get the object "back into the container." Viktor Grabner, Technical Evangelist at Microsoft, indicates that many of the usability difficulties introduced by OLE 1.0

will simply not arise under 2.0, at least in the most common cases.

### How Useful Is OLE?

You'll have to wait for OLE 3.0 or higher to share Windows application data across a LAN. Until programmers implement the version 2.0 changes, you will have to put up with a somewhat awkward interface for using OLE. When you buy or upgrade Windows software, you'll want to determine carefully whether the programs can be an OLE server or client. (See the table for a list of OLE-aware software.) But OLE can be a good tool for linking or embedding pictures, charts, tables, graphs, and subsets of documents from one Windows application to another.

A methodical approach to OLE and the careful organization of your source and destination documents will, over time, let you effectively share object data among your applications. But be aware that OLE is a limited tool that you won't be able to use every time you have two applications that need to exchange information. ■

*Barry Nance, a programmer for the past 20 years and a contributing editor for BYTE, is author of Using OS/2 2 (Que, 1992), Network Programming in C (Que, 1990), and Introduction to Networking (Que, 1992). He is the editor for the IBM Exchange on BIX, where you can reach him as "barryn."*



# INTRODUCING THE LANSTOR® DISK ARRAY.

## NONSTOP STORAGE FOR NONSTOP NETWORKS.

SEE US AT BOOTH #1564  
NETWORLD 92™



Today's Novell® networks operate around the globe and around the clock. These networks require much more than just protection against data loss. They demand

*uninterrupted network operation.* Storage Dimensions answers that demand with the new LANStor Disk Array, delivering nonstop storage for today's nonstop networks.

With its unique architecture and fully-redundant power supply modules, the LANStor Disk Array pushes fault-tolerance to a new level. Hard disk and power modules can be instantly "hot-swapped." Data is reconstructed on-line, on-the-fly. There's no system downtime. There's no data loss.

The LANStor Disk Array is also built for speed. Its independent processor frees the server CPU from time-consuming array management. State-of-the-art Fast SCSI-2 drives and adapters speed data throughput. Add our award winning LANStor drivers and you get array performance that's second to none.

The LANStor Disk Array, in 2.1 to 4.2 GB models, supports RAID 5 and adapts in minutes for rack mount, tower or desktop installations. Larger systems can be configured to deliver more than 100 GB of nonstop storage. For more information and a copy of our white paper, "Fault-Tolerant Storage for Nonstop Networks," call 800-765-7895 or write Storage Dimensions, 1656 McCarthy Boulevard, Milpitas, CA 95035.



 STORAGE DIMENSIONS

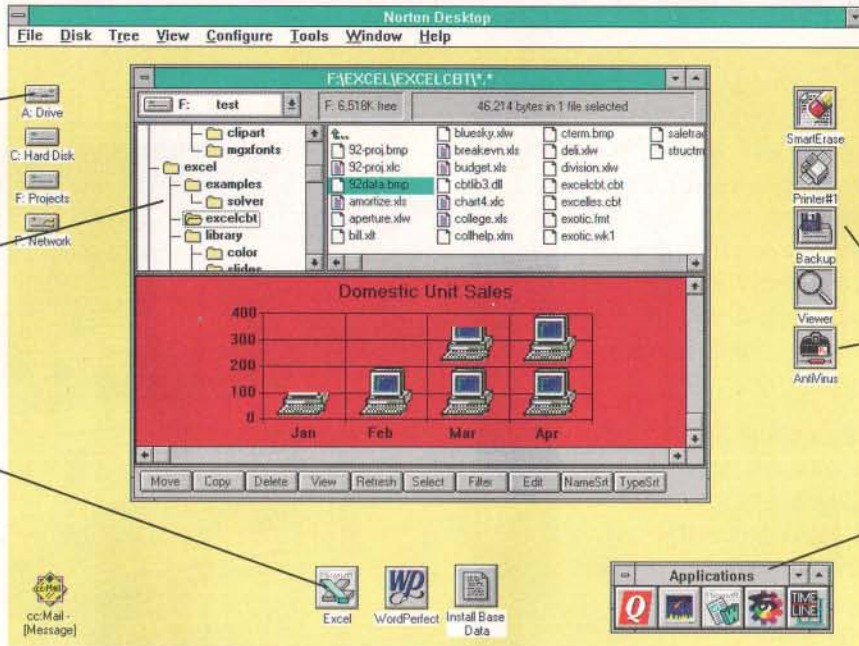
Circle 124 on Inquiry Card.

# NORTON DESKTOP FOR WINDOWS SAVES TIME, MONEY, ENERGY, AND DATA.

With Norton Desktop for Windows, your drive icons sit right on the desktop, so you get direct access to your files.

Click on a drive icon for easy file management. The drive window includes a tree pane, file pane, and a customizable button bar with a view option.

For total convenience, applications or files can be dragged onto the desktop for easy access. Open files effortlessly with a quick mouse click or, by dragging the file to the application.



The Norton Desktop is a completely integrated environment. You can drag-and-drop files from the drive window to a tool, drive icon, application, or onto the desktop itself.

All the utilities you need to backup, protect, and repair your data sit right on your desktop. You can drag files or drive icons directly to the tool you need.

Keep your favorite applications in a handy customizable toolbox. Launch the application easily with just a click of the mouse.

That's a package full of savings. Norton Desktop for Windows 2.0 enhances Windows in all the important ways. It helps you work faster, smarter, and with better results.

## Saves Time.

Something you don't have a lot of. We've improved file management, placing drive icons right on the desktop, so you get immediate access to all your files and applications. Speed search, button bar, viewer, customizable fonts, and collapsible tree structure are all designed to save you time. Full drag-and-drop allows you to drag applications and files out of the drive window to anywhere on the desktop so you have instant access to them.

## Saves Money.

We all know time is money. And because Norton Desktop looks so much like Windows, you won't have to waste time learning how to use it. You get most everything you need to run your PC in one comprehensive package — a great, money-saving value.

"Norton Desktop for Windows 2.0 is still one of the best productivity tools you can buy."

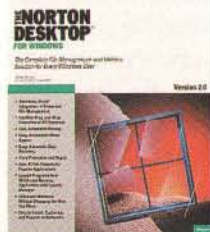
—PC Computing, 5/92

## Saves Energy.

Because Norton Desktop can be easily customized, you invest your energy in your work, not in trying to figure out how to get it done. Customizable auto-load frees you from reloading applications that you use daily. And, SuperFind™ allows you to locate "lost" files, across networks or in the background.

## Saves Data.

Lost or corrupted data can cost you time, money, and energy. The selection of utilities in Norton Desktop helps you maintain your data. Virus protection and repair, automatic backup, and data recovery can be easily accessed from the desktop; or, scheduled to run unattended, or in the background. Plus, they support all major networks. Norton Desktop for Windows 2.0 is just \$179.00 (S.R.P.) at your dealer. Or, call 1-800-554-4403 for an instant FAX Data Sheet (enter 453).\*\* The sooner you get it the sooner you'll save.

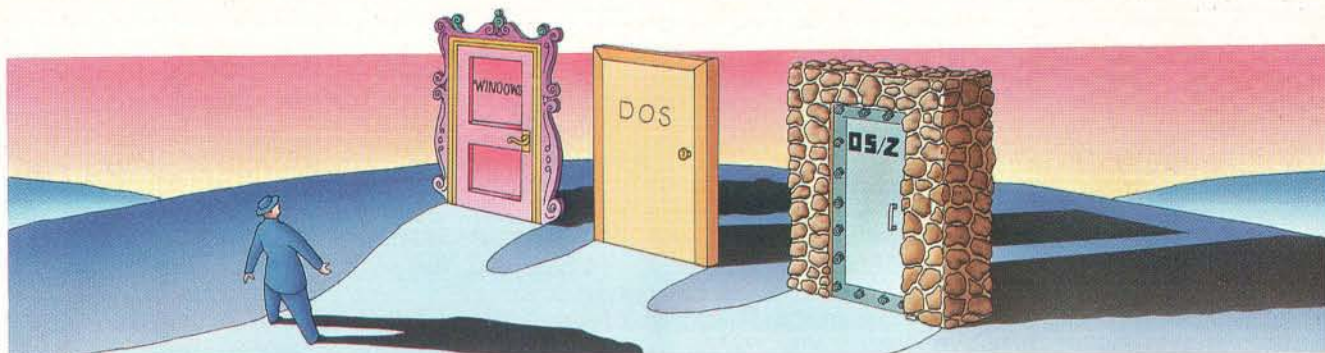


Network Monitoring Admin Pack  
NOW AVAILABLE  
Call 1-800-342-4714  
ext. 291 for more information.

© 1992 Symantec Corporation. \* Price in U.S. dollars. \*\* For information in Canada, call 1-800-465-2266. In Europe, call 31-71-353111. In Australia, call 612-879-6577. Everywhere else, call 408-252-3570. All trademarks or registered trademarks are those of their respective holders.

# SYMANTEC.

Circle 138 on Inquiry Card.



# The OS/2 Alternative

How to decide whether OS/2 or Windows is better for you

MARK MINASI

**I**s OS/2 a better alternative environment than Windows? That depends on which Windows you mean. OS/2 2.0 has a better structure than Windows 3.1, but Windows NT offers OS/2 2.0 some real competition. That's not really the big question, though. Perhaps a better one is, Which environment will work better for you or your business?

The answer to that question is based on several important considerations. What are the environment's technology underpinnings? Will it work with your other environments? And what kind of software will be available for the environment? I'll examine each of these questions in turn.

## Dueling Architectures

The most significant advance that OS/2 2.0 or Windows NT provides is access to the 32-bit memory capabilities of the 386 family of Intel chips (i.e., the 386DX, 386SX, 386SL, 486DX, 486SX, or 486DX2 chips). Intel chips up to and including the 286 cannot handle data or code segments larger than 64 KB because the chips require the system to manipulate memory one segment at a time. The trouble with the segments is that the registers that refer to them are only 16 bits wide, and  $2^{16}$  is 64 KB; hence, the limitation.

Although the 286 chip can address 16 MB of memory, it must do so in 64-KB increments. Imagine how annoying and time-consuming it is to have to write a program that controls megabytes of memory but must do it 64 KB at a time. That's what Windows (when I say *Windows* without a version designator, I'll mean version 3.1 or any successor DOS-based products) programs must do. Windows was built around the 286 protected-mode memory architecture, so it's hobbled by this nuisance barrier.

It's a nuisance for programmers and users alike. First, any 16-bit program must include lots of overhead for the code needed to play the shell game with memory. Second, some programs don't get written simply because it's too much trouble to do within a 16-bit architecture—and lacking software is a pretty big nuisance.

In contrast, with a 386-based system, segments can be addressed with 32-bit registers, and each segment can be 4 GB. That nearly eliminates the segment-arrangement game, which means faster code and code that addresses larger data segments.

If you peruse a programming manual for either OS/2 2.0 or Windows NT, you'll see that there's more to 32-bit architectures than just memory sizes. Even though it's bad practice, designers of operating systems and languages tend to mold their creations around the target CPUs, imbuing the characteristics of the languages and operating systems with

the limitations of the CPU.

For example, take a look at the string variable type on most of the implementations of the BASIC language. In the Apple II BASIC, there's a maximum string length of 255 characters; the PC world has 64-KB strings in QuickBasic. There's no good reason for this except laziness on the part of the compiler implementers—they just wanted to make the variable that keeps track of the length of a string no larger than the word of the target machine, which was 8 bits on the Apple's 6502 and 16 bits on the PC's 8088. An example relevant to Windows is the 192 KB of system resources, a constraint that most Windows users eventually come to know. The 192 KB is actually three 64-KB areas, each restricted to 64 KB by the segment-size barrier of a 286.

The benefits of 32-bit architectures extend indirectly to other parts of the PC, such as the file system (it's easier to maintain 32-bit sector numbers) and the video system (it's simpler to handle objects—bit maps in particular—larger than 64 KB). If you believe that either Windows NT or OS/2 2.0 will win the battle of the desktop, you can see that battle as a win-win situation: 32 bits either way. So the first benefit of using OS/2 2.0 instead of Windows is access to more memory—4 GB versus Windows' 16 MB—and easier access to that memory.

## Multitasking and Multithreading

Under Windows, multitasking is *cooperative*. Once the Windows scheduler yields control of the CPU to an application, the scheduler can't regain control of it until the Windows program yields it. Each application is on its honor not to hog the CPU. The catch is, some Windows applications are more honorable than others.

Under OS/2 2.0, programs have *threads of execution*, or units of program activity. A thread is basically a virtual instruction pointer, a data structure within the operating system that keeps track of where you are in a program. What is interesting is the OS/2 2.0 notion of *multithreading*: the ability to have a number of parts of your

program running at the same time. For example, you could have part of your word processor accepting keystrokes, another part of your program printing text in the background, and a third part automatically and transparently saving what you're doing every few minutes—simultaneously.

This is a relatively new notion in programming, so many third-generation languages do not support it very well. Ada, Modula, and SmallTalk have multithreading built into them, but most other programming languages must have it added on. Because of that, and because most developers don't have any idea how or why to multithread, you don't see very many multithreaded applications for OS/2 2.0.

Windows knows nothing of multithreading. OS/2 2.0 has supported it since version 1.0, and Windows NT supports it as well. Further, Windows NT is smarter than OS/2 2.0 at using multithreading. When I described how three threads could be running simultaneously in a word processing program, I wasn't telling the whole truth. If there's only one CPU in the computer, there's going to be only one thread running at a time. The trick with a good multitasker is to provide the illusion at the user

level that there are several processors, each a bit slower than the single actual processor that's under your PC's hood.

Windows NT goes further because it supports multiprocessor systems: Build your application to be multithreaded, and the operating system will automatically distribute the threads among the various processors. A well-designed graphical program that places its interactive parts in a thread other than the one that updates the graphical screen will look better on a single-processor PC because the program can respond to commands without having to first wait to repaint the screen. That same application will look even better, however, on Windows NT because its transparent support of multiple processors for multithreaded code would mean an instant, free-of-charge boost in real power with every added processor.

In addition, multithreading is preemptive, not cooperative. Unlike in Windows, a system hog can be yanked off-stage after it has overstayed its welcome in the CPU's spotlight. In this regard, however, Windows NT outstrips OS/2 2.0. Although OS/2 2.0 itself uses preemptive multitasking, there is a single main thread that can

become congested, leading to unnecessary waits. It is an old design flaw that comes from the original OS/2 1.1 Presentation Manager. Under Windows NT, the hourglass disappears when you move the mouse cursor off the window of the program that is busy, restoring the old arrow pointer.

### GUIs Great and Not So Great

All advanced operating systems offer three important things: multitasking, a lot of memory, and a GUI. If you work with the Windows GUI for a while, you get the feeling that it was designed by someone who'd really rather be using a command-line interface. Want to install a printer font? Well, there's a program called the Print Manager, but that's got nothing to do with fonts. If you open the Control Panel, you'll see an option for fonts, but it's the option for installing screen fonts or a True Type font, not a printer font. And if you want to have more fun, try out the File Manager.

The OS/2 2.0 betas that I saw from November 1989 to October 1991 were, on the whole, stable, well-built products that ran OS/2 code and multitasked DOS programs

# You Can Look



9065s



T560i



T660i

And you'll want to take a look at NANAO's newest monitors. All day. Every day. Because these NANAO monitors deliver the highest *flicker-free* resolution in their class and conform to the strict new Swedish MPR II

requirements. Some even meet the TCO guidelines, the world's toughest VLF and ELF emission standards. You'll also find that each monitor has NANAO's *intelligent* front control panel.

Designed for computer graphics professionals, the award-winning FLEXSCAN **T-Series** features Trinitron CRTs, providing the sharpest contrast and brightest images in the industry. Low distortion and a wider display

1991 BYTE AWARD OF DISTINCTION applies to T560i monitor.

well. I opined in print that I could not understand why IBM continued to call this a *beta* product; why didn't it *ship* it?

The answer, of course, was Windows. Support of Windows programs was essential in the eyes of the marketplace and for IBM's own sense of well-being. IBM and Microsoft had split up, but in Big Blue's eyes, Microsoft had suffered the greatest loss—and IBM would show it. So Windows support slowed the whole process. And somewhere in there, the WPS (Workplace Shell) was born.

The WPS wasn't a stake through OS/2 2.0's chest, but it came pretty close to impromptu open-heart surgery. Released with the 167 beta, it revolutionized the OS/2 GUI and annoyed nearly every OS/2 developer. It broke much of the existing code, forcing the few remaining true believers in the "OS/2 way" to rewrite and recompile their code. This was probably the worst thing that happened in the whole OS/2 development cycle.

The good news is that WPS is really neat when it works and once you have grasped its paradigm. Everything on the OS/2 desktop is an object, and every object has things that you can do to it. You access

those options with the right mouse button. To learn WPS quickly, just start clicking the button on everything.

For example, there's only one item on the desktop relevant to the printer: the Printer object. Select it with the right mouse button, and you can control its Options (i.e., a menu on most objects). Within Options, you add and subtract fonts, change printer drivers, control queue options—the works. But try selecting the Printer object with the left mouse button. The object opens to a small window that contains objects that represent the print jobs in the queue. Select any of them with the right mouse button, and you will see the Open option. Select it, and a graphical viewer shows you the print job before it prints.

With this option, there is no need for WYSIWYG or print preview. Just work from a fast, sleek text editor, print to a job queue—be sure to Hold the queue first—and preview the job using the right mouse button. Sound silly? It isn't. I've found that DeScribe works nicely that way.

What about Windows NT? Sadly, it has been saddled with the look and feel of its little brother. If Microsoft is smart, it will change that.

## Developer Developments

What's going on with OS/2 development? Well, not much. According to John McFetridge, the former head OS/2 developer for Corel, "This is the difference between Microsoft and IBM. I had a guy practically living in Redmond, working with Microsoft and learning about NT. IBM, on the other hand, wanted me to pay \$2000 to come to a conference so that they could tell me why the late beta didn't work. We needed some device support extensions from IBM, extensions that IBM had written for Corel. We wanted to include them in CorelDraw for OS/2. We asked for the rights to include the extensions from IBM; it took four months for IBM to respond. Now, don't misunderstand—when the right people at IBM found out how long it had taken, they were horrified. On the other hand, we needed the WLO [Windows Linking Objects] from Microsoft. They faxed us an agreement, we faxed it back, and we had the code the next day.

"At the same time, IBM has really done a masterful job of emulating Windows—so good a job, in fact, that there's no reason for us to develop an OS/2 version of Corel 3.0. We will devote our energies to

# At Us All Day.



F750i



F550i

area make the *flat-square* FLEXSCAN **F-Series** the ideal monitors for those seeking an ideal Graphical User Interface and Desktop Publishing environment. For uncompromising quality at an affordable price, the FLEXSCAN

**S-Series** is your choice. And every NANAo monitor comes with a relentless attention to detail.

Whether you work in front of a 14" or 21" monitor, for two hours or twelve, you'll appreciate the

performance and ergonomics of NANAo monitors.

Take a look at your nearest NANAo dealer today, or for more information call NANAo.



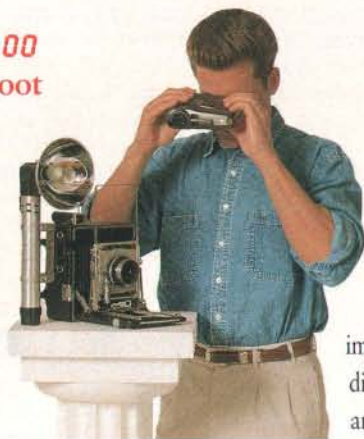
# NANAo

1-800-800-5202  
1-310-325-5202 (CA)  
Fax: 1-310-530-1679

Trinitron, Windows and FLEXSCAN are trademarks of their respective companies.

# Join the New Imaging Revolution

10:00  
Shoot



The new *Canon RC-570 Still Video Camera* records 25 electronic photos on a reusable 2-inch video floppy disk. No film or processing. No waiting. No waste. The 3X zoom lens and 450-line frame video resolution ensure superior image quality. Speed, portability, ease of use, and direct playback to a TV monitor make the RC-570 an ideal imaging tool.

10:12  
Process

Canon digitizers allow still video images to be easily input to Macintosh®, PC, or NeXT™ computers. Integrate graphic files into applications like DTP, Databases, Multimedia and Presentations. You can even record from your computer back to video floppy with our *Electronic Still Presentation* systems.



10:45  
Present



Use the RC-570 still video camera connected to a TV monitor to deliver impressive computer generated presentations directly from your video floppy disk. No computers. No slides. No projectors. No hassles. *That's Revolutionary!*

Learn more about this revolution, call 1-800-221-3333 ext. 313.



## Canon

making it an excellent product on the Windows platform, which in turn will make it an excellent product under OS/2—and whatever version of Windows takes off.”

A survey of software vendors indicated that they either wouldn't discuss their OS/2 plans (which meant that they didn't have any), said they had some great software that ran under Windows that would also run under OS/2, stated that they had some great software that ran under OS/2 1.3 that would (and often didn't) run even better under OS/2 2.0, or (rarely) said they had some great OS/2 software, which they were willing to demonstrate.

What sort of OS/2 2.0 end-user applications are available? Only CorelDraw 2.0 and Lotus 1-2-3. Some terrific packages are coming soon from Micrografx, Draw and Designer, WordPerfect, Ami Pro, Borland, and DeScribe.

For developers, there are only few OS/2 2.0-specific tools. Borland C++ seems to be the El Dorado that everyone's waiting for, but it sure wasn't around during the beta period. It will, no doubt, be out by the time you read this article.

Who is using OS/2 nowadays? The bulk of my OS/2 training business comes from people who are downsizing. For example, there's a big bank in Florida that approves a lot of loans. Over the years, banks have had many loan approval programs, from simple portfolio assessors to whizbang expert systems. Many of them, however, are encased in COBOL on a mainframe. But there's nothing being done there that a few 486s can't do on a LAN, and at a small percent of the cost. Therefore, they take their mainframe COBOL, move it to a PC running OS/2, and compile with Micro Focus COBOL/2. It works like a charm.

The bank in Florida uses only the OS/2-based PCs to compile and test the code. It continues to do business on the mainframe. But it's getting more bounce for the ounce from each mainframe cycle because it's just about moved testing off the mainframe. Folks who've lived on a steady diet of mainframe COBOL just about fall off their chairs when they are introduced to COBOL Animator. It almost makes writing COBOL fun. Other firms are quite happy running their operation from OS/2.

“If you're building strictly for OS/2, you've got a simple, solid foundation,” one MIS director told me. “It works, and that's that. It's better than DOS, with the big memory and all, and it's more understandable than the mainframe.”

### Whither OS/2 2.0?

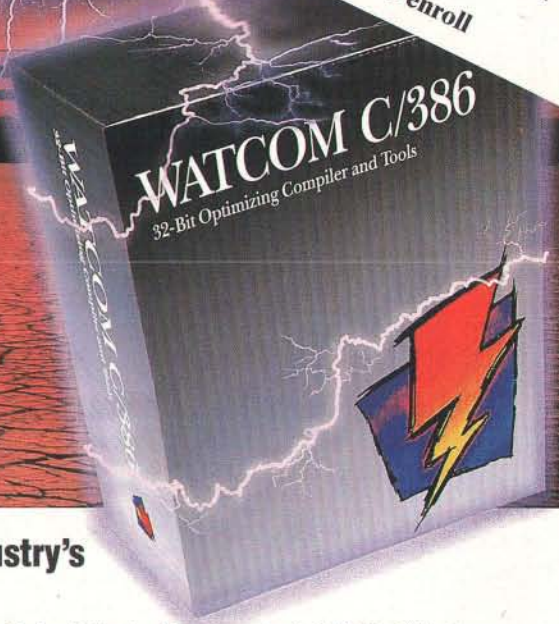
I believe that it's chiefly in the mainframe shop where OS/2 2.0 will win. The interoperability that OS/2 2.0 offers is fantastic.

*continued*

# Delivering the Power: WATCOM C9.0/386

Windows™ NT  
Development Tools from WATCOM  
Featuring powerful new GUI debugger  
NOW available in Beta  
Call 1-800-265-4555 to enroll

- ▶ **The Widest Range of 32-bit Intel x86 Platforms**  
32-bit DOS, 32-bit Windows, OS/2 2.0, AutoCAD ADS
- ▶ **The Industry's Leading Code Optimizer**  
Advanced global optimizer with new 486 optimizations
- ▶ **The Most Comprehensive Toolset**  
Debugger, profiler, protected-mode compiler and linker,  
32-bit DOS extender with royalty-free run-time, licensed  
components from Microsoft SDK, and more
- ▶ **The Best Value in 32-Bit Tools: \$895\***



## Unleash 32-bit Power!

WATCOM C9.0/386 lets you exploit the two key 32-bit performance benefits. The 32-bit flat memory model simplifies memory management and lets applications address beyond the 640K limit. Powerful 32-bit instruction processing delivers a significant speed advantage: typically at least a 2x speedup.

### You Get:

- ▶ **100% ANSI and SAA compatible:** C9.0/386 passes all Plum Hall Validation Suite tests
- ▶ **Extensive Microsoft compatibility** simplifies porting of 16-bit code
- ▶ **Royalty-free run-time** for 32-bit DOS, Windows and OS/2 apps
- ▶ **Comprehensive toolset** includes debugger, linker, profiler and more
- ▶ **DOS extender support** for Rational, Phar Lap and Ergo
- ▶ **Run-time compatible with WATCOM FORTRAN 77/386**

**32-bit DOS** support includes the DOS/4GW 32-bit DOS extender by Rational Systems with royalty-free runtime license

- ▶ Virtual Memory support up to 32Mb

**32-bit Windows** support enables development and debugging of true 32-bit GUI applications and DLLs.

- ▶ Includes licensed Microsoft SDK components

**32-bit OS/2 2.0** support includes development for multiple target environments including OS/2 2.0, 32-bit DOS and 32-bit Windows

- ▶ Access to full OS/2 2.0 API including Presentation Manager
- ▶ Integrated with IBM Workframe/2 Environment

**AutoCAD ADS** and **ADI** Development: Everything you need to develop and debug ADS and ADI applications for AutoCAD Release 11

**Novell's Network C for NLM's SDK** includes C/386

## The Industry's Choice.

**Autodesk**, *Robert Wenig, Manager, AutoCAD for Windows:*

"At Autodesk, we're using WATCOM C/386 in the development of strategic new products since it gives us a competitive edge through early access to new technologies. We also highly recommend WATCOM C/386 to third party AutoCAD add-on (ADS and ADI) developers."

**Fox Software**, *David Fulton, President:* "FoxPro 2.0 itself is written in WATCOM C, and takes advantage of its many superior features. Optimizing for either speed or compactness is not uncommon, but to accomplish both was quite remarkable."

**GO**, *Robert Carr, Vice President of Software:* "After looking at the 32-bit Intel 80x86 tools available in the industry, WATCOM C was the best choice. Key factors in our decision were performance, functionality, reliability and technical support."

**IBM**, *John Soyryng, Director of OS/2 Software Developer Programs:* "IBM and WATCOM are working together closely to integrate these compilers with the OS/2 2.0 Programmer's Workbench."

**Lotus**, *David Reed, Chief Scientist and Vice President, Pen-Based Applications:* "In new product development we're working with WATCOM C because of superior code optimization, responsive support, and timely delivery of technologies important to us like p-code and support for GO Corp's PenPoint."

**Novell**, *Nancy Woodward, V.P. and G.M., Development Products:* "We searched the industry for the best 386 C compiler technology to incorporate with our developer toolkits. Our choice was WATCOM."

# WATCOM

## 1-800-265-4555

### The Leader in 32-bit Development Tools

415 Phillip Street, Waterloo, Ontario, Canada. Telephone: (519) 886-3700, Fax: (519) 747-4971. \*Price does not include freight and taxes where applicable. Authorized dealers may sell for less. WATCOM C and Lightning Device are trademarks of WATCOM Systems Inc. DOS/4G and DOS/16M are trademarks of Rational Systems Inc. Other trademarks are the properties of their respective owners. Copyright 1992 WATCOM Products Inc.

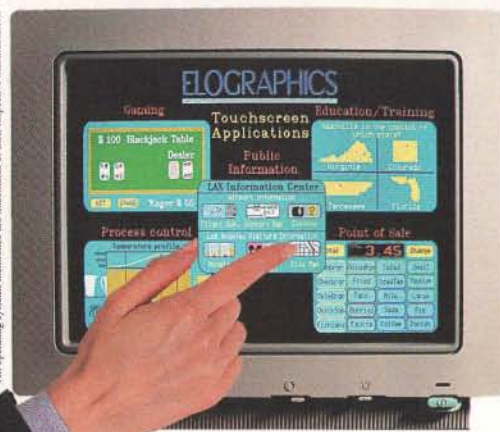


Circle 137 on Inquiry Card.



# We're Up on Touch

All operating systems mentioned are trademarks of their respective manufacturers.



You can have your mouse-driven application up and running with touch input instantly, using one of our TouchMonitors and software for Windows, OS/2, MS-DOS, or Macintosh environments. We offer two types of touchscreen technologies, the largest selection of components and development tools, and expert assistance. It's easy to get your application up and

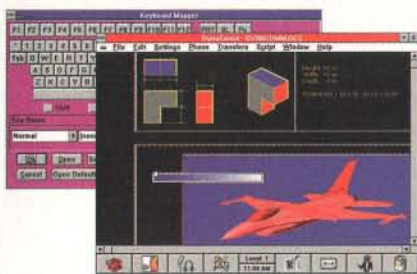
running on touch. Just call the touchscreen company.

Elographics, Inc.  
105 Randolph Road  
Oak Ridge, TN 37830  
615-482-4100

**ELOGRAPHICS**  
the touchscreen company

©1992 Elographics, Inc.

## If You Need to Communicate...



Sample of DEC VT-340 ReGIS graphics, configurable toolbar, and keyboard mapper.

DynaComm 3.1 Includes:

- ◆ DEC VT-340
- ◆ 16 terminal emulations
- ◆ 19 network connectors Including TCP/IP
- ◆ 10 transfer protocols
- ◆ 300+ script commands
- ◆ Technical support

See us at **Comdex** booth

WINDOWS is a trademark of Microsoft Corporation. FutureSoft and DynaComm are registered trademarks of Future Soft Engineering, Inc.



**FutureSoft**

1001 South Dairy Ashford, Suite 101 • Houston, Texas 77077  
713.496.9400 713.496.1090 FAX

Retail \$249 (Network pricing available)

And who doesn't? Today's fast moving corporate world demands quick, easy access to mainframes, minis or other PCs. **DynaComm** provides the most powerful WINDOWS™-based communication features. Microsoft® agrees: they

selected **DynaComm** as their worldwide standard for data communications. So if you need to be in touch with the rest of the world or just the rest of your company...

**...We Need to Communicate.**

It's probably the most reliable DOS multitasker I have ever worked with, and its Windows compatibility is stunning. For a comparison, I ran the Spectragraphics Windows benchmark, a suite of 125 speed tests, on OS/2 2.0. It outpaced Windows in 25 of the tests, was about equal in 80 of them, and was more than 20 percent slower for the remaining 20 tests. Not bad considering that OS/2 2.0 shoots for compatibility with the slower Windows 3.0.

That's all well and good, but that's technology. What's going to win here is marketing. These days, it appears that IBM marketeers couldn't sell fire extinguishers to Joan of Arc. The first set of OS/2 ads were incomprehensible and dull, based on pictures of Olympic athletes. And then came the new ad that shows rows of computers. It reminds me of a graveyard.

Then why develop for OS/2? Because IBM is committed to it. If your customers are from Fortune 100 companies, people with IBM mainframes and databases built around those mainframes, they will be looking seriously at OS/2 if they're not already committed to it. IBM is not fooling around either. There are some nice microcomputer-to-mainframe products available, not the least of which is support for APPC (advanced peer-to-peer networking), which is impossible under DOS (it takes too much RAM for DOS to use it beneficially).

But what of the rest of you, the folks who are trying to solve specific problems for clients? The reliance on C-based systems means that there are plenty of cross-development tools. However, what if you are going to build the next great word processor? There's only one tool: assembly language—hand-tuned—and hard work.

And how about the techies, the support folks, the office kibitzers? What should you recommend for the office's operating-system direction? Here are a few tips. First of all, relax. Nothing's going to become a standard unless the market says it is—and that means you and me. If it's that great (as Windows was), you will know. Nothing happens quickly in the PC world anymore. Second, it'll support your existing applications, or the market will crush it. No matter which of the two "leading-edge" operating systems, OS/2 2.0 or Windows NT, becomes king, you and I will end up the beneficiaries. ■

*Mark Minasi writes and conducts seminars on Windows, OS/2 2.0, and OS/2 1.3 to 2.0 migration and is the author of the book Inside OS/2 (New Riders Publications, 1992). His firm, Mark Minasi & Co., is based in Arlington, Virginia. You can contact him on BIX as "mjminasi."*



# Don't Shoot It, Troubleshoot It.

**LANDMARK... the widest selection of PC diagnostic software, firmware, and hardware in the world!**

## PC WON'T BOOT? KICKSTART IT!

Don't replace your motherboard, use **KickStart 2™**. When serious hardware problems occur, nothing gets you up and running as fast. KickStart 2 *measures power within 2.5%* on all four voltages, *shows Power-On Self-Test (POST) failure codes*, and features *on-board ROM-based diagnostics* allowing you to determine and remedy the problem quickly, easily, and inexpensively!

Built-in serial and parallel I/O *allows for testing remote via modem*, or simply logging results to a remote terminal, printer, or laptop. You can configure your own test routines and store them in KickStart 2's battery backed-up CMOS RAM for quick future use. On-board switches, LEDs, and digital displays allow complete control over testing in systems lacking video or disk.

KickStart 2 is the ultimate **SECURITY CARD**, too. With two levels of password protection and pre-O/S activation, you can confidently prevent unauthorized use of your PC.

Includes serial and parallel loopback plugs and the Landmark **JumpStart™** AT ROM BIOS for testing ATs that don't issue POST codes. KickStart 2 works independent of your operating system. You can use on DOS or UNIX systems. **CALL for current pricing.**



*"The number of tests KickStart 2 can perform is mind-boggling... IF THE KICKSTART 2 CAN'T FIND THE PROBLEM, IT PROBABLY EXISTS IN YOUR HEAD, not in the hardware."*

*Rich Santalesa, Computer Shopper*

*"KickStart 2 system diagnostics board helps users check out virtually every aspect of a PC's hardware system... THE BOARD IS A WORTHY INVESTMENT for computer maintenance."*

*David Claiborne, PC Week*

## PROFESSIONAL LEVEL PC TROUBLESHOOTING

Landmark **Service Diagnostics™** is ideal for professionals requiring the most exhaustive diagnostic test capabilities.

Service Diagnostics is not just a single product, but a complete LINE of products. It's comprised of software, hardware, and firmware so you can choose the best "tool" for the job.

When your PC won't boot, you'll need **ROM POST** firmware, a plug-in chip that virtually "jumpstarts" the system to determine what's wrong. And, when your printer isn't working, you won't know whether it's the LPT port, cable, or printer without hardware, like our loopback plugs (which together with our software completely test the COM ports).

To provide you a complete troubleshooting resource, Service Diagnostics is offered in single modules or in "kits." Components include; CPU-specific software (PC, XT, AT, 386/486, PS/2), ROM POSTS (PC, XT, AT) and floppy alignment disks (3.5" and 5.25").

All the Service Diagnostics software modules are available in self-booting versions for use with non-DOS operating systems like UNIX.

Service Diagnostics is powerful and flexible. Hundreds of tests can be performed on your motherboard, memory, video, COM ports, floppy and hard drives, printer, and more. **CALL for a customized quote on the kit that's right for you!**



*Overall, Service Diagnostics: The Kit was the best performer you're running a service department, SERVICE DIAGNOSTICS IS NOT AN OPTION, IT'S A NECESSITY."*

*Bill O'Brien, PC Magazine*

## PC DIAGNOSTICS MADE EASY

You don't need to be technical to use **PC Probe™**. With clear, intuitive, pull-down menus and 206 pages of on-line help, troubleshooting your PC is truly **MADE EASY!**

And, you don't have to be handy with a screwdriver to make PC Probe pay for itself. Just by providing a diagnostic report to your service and repair shop, you'll save money and receive quicker service.

PC Probe runs over 150 tests including; motherboard and CPU, memory, video card and display, keyboard, COM ports, floppy drive and controller, hard drive and controller, and more. Includes **VirusCure**, Landmark **Speed Test**, **AT SetUp** & loopback plugs. **CALL for current pricing!**



## SLASH HARD DISK SET-UP TIME

If you install, upgrade, or maintain hard drives, then you need **DiskBase™**. It'll save you boat-loads of time and money by putting the exact hard disk information you need at your fingertips... whenever you need it.

DiskBase reveals 12 technical specs on over 2500 hard disk drive models and 8 technical specs on over 220 controllers. Once you've located the correct hard disk model, you can instantly bring up a listing of all compatible controllers. **CALL for current pricing!**

- Toll Free Tech Support
- 90 Day Money Back Guarantee
- Federal Express Shipping

## CALL (800) 683-6696

FAX (813) 443-6603 • Int'l (813) 443-1331

**LANDMARK**  
RESEARCH INTERNATIONAL CORPORATION  
703 Grand Central Street • Clearwater, FL 34616



## THE 5 MINUTE SOLUTION TO FLOPPY DRIVE FAILURE

With **AlignIt™** you can clean, diagnose, and align your floppy drives in minutes without a scope. Patented technology requires only a screwdriver to perform ANSI-accurate alignments (.3 mils).

AlignIt is ideal for corporate users with multiple PCs. The **GOLD STANDARD** feature allows you to align all your PCs to the same in-house standard, guaranteeing that all your floppies are perfectly interchangeable between PCs! Available in 3.5" or 5.25" for both high and low densities. **CALL for current pricing.**

# Instrument Control for Windows

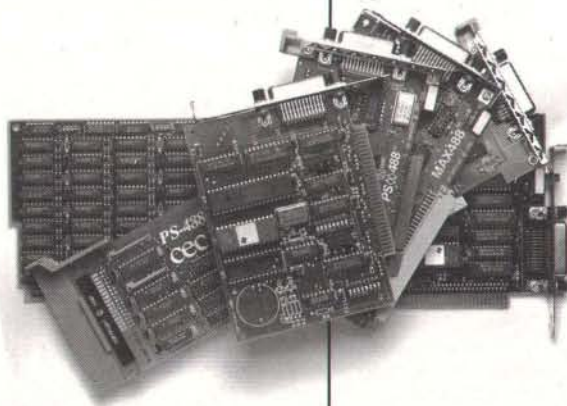
You can now control any IEEE-488 (HP-IB, GP-IB) instrument using CEC's responsive IEEE-488 hardware and software for Windows™.

## WINDOWS MADE EASY

Writing a Windows application is easy. You can use one of our example programs or write your own program using our standard IEEE-488 functions. When the program is written, you link it with our Dynamic Link Library and your Windows program is ready to run. Visual BASIC, Turbo C++, Turbo Pascal for Windows, and HP Instrument BASIC for Windows are all supported.

## PERFORMANCE

CEC has the world's fastest IEEE-488 controller and software that's designed to give you top performance. Couple this with our printer and plotter utilities, third party software support, and software library and you have the professional package you need for just \$395.



## NO COMPROMISES

All IEEE-488 functions and features are supported within Windows, making graphing, analysis, and access to '488 data easier and better than ever before.

Literature 1-800-234-4232  
Tech support 617-273-1818  
FAX 617-273-9057



CAPITAL  
EQUIPMENT  
CORP.

Capital Equipment Corporation 76 Blanchard Rd. Burlington, MA 01803

All product names are trademarks of their respective manufacturers.

Circle 79 on Inquiry Card.



# The Pick of Windows

Fifteen books (and some disks) run the gamut from Windows beginners through experts

HUGH KENNER

October, and we've entered the Second Year of Windows. Year One seems to have started in the summer of 1991, when Windows books began to crowd the shelves and consultants began to get windowing queries from clients. And that was in the era of version 3.0, still so clumsy it was plausible to dismiss Windows as fallout from a multimillion-dollar temper tantrum off in Seattle. One man I know who has committed his career to Windows says he'd never have touched it prior to version 3.1 (April 1992).

What have we here? By one extreme account, we have an effort to make a wheelchair behave like an outboard motor. MS-DOS versus Macintosh, you see. In the standard example, a Mac spares you the bother of pecking out DEL JUNKFILE.TXT (16 key-strokes—17 including Enter). Instead, your mouse just drags JUNKFILE's icon over to a Trashcan icon; whereupon, *ZzzAP!* (Oddly, Windows doesn't emulate that famous example; you select the file from a list and pick the word Delete from a menu.)

This all gets entangled in McLuhanesque wrangles about names versus icons, linear letter-after-letter versus all-at-once look-and-zowie. "People are visual creatures," one book assures us. "Most of what we learn comes through our sight. We remember best what we can place in a unique location, not what we tag with a text name." Translation: If icons are giving you trouble, you've not yet come to terms with your own essential nature. (But relax, you don't need a shrink, you just need This Book.)

Which book? Dozens, literally dozens, are crying out to be needed. Odd: Wasn't Windows supposed to deliver us from the tyranny of text?

If you're new to Windows, the first one you need, in my opinion, is Kay Yarborough Nelson's *Little Windows Book*, an easy, illustrated, low-key walkthrough with a Here's How appendix, meant to get you comfortable and started. Which it will do. And when you feel more ambitious, you'll be ready to look at some of those other books.

A number of them sufficiently resemble a big general-purpose manual to prompt the suspicion that they're meant for people who've pirated the software. Rethink that idea. The software comes from Microsoft, and Craig Stinson's *Running Windows 3.1* comes not from some cunning parasite but from Microsoft Press (which confidently labels the very first printing "Bestseller!"). It's a 526-page rewrite of Microsoft's anonymous 650-page Windows 3.1 manual; moreover, it comes shrink-wrapped with—"Free!"—Kris Jamsa's *Concise Guide to Microsoft Windows 3.1*, a mere 195 pages.

If we need Jamsa as a crib to Stinson helping us with Anon, that totals 1371 pages just

for hand-holding: by a plausible word count, over half the length of the King James Bible (in which, by the way, the word *windows* appears 30 times; "For death is come up into our windows," the prophet Jeremiah was crying about B.C. 630, responding to some vision of Unrecoverable Application Errors).

It grows perfectly clear that Windows will never be as intuitive as its pushers let on. That's been sensed even off in Darkest Microsoft. So the 3.1 manual is a vast improvement on 3.0's (which suggested Solitaire for painless practice with some Windows commands, but forgot to spell out how to get Solitaire running).

And while such fuss was going on in Seattle, in other parts of the country a lot of big hand-holder books were being derived from beta copies of 3.1. One reason for Microsoft's prodigality with betas was a hope for a deluge of books to accompany the program's release. But beta users couldn't examine the final version of the program's manual, in part because no final version existed till the eve of press time. So, uncertain what they might be competing with, they typically followed a strategy of exhaustiveness. (And many were updating their own books on 3.0, users of which really did need structured help.)

Thus, *Windows 3.1 Revealed* by Robert Mullen, Paul Hoffman, and Barrie Sosinsky weighs in at 1252 pages. Among its seven "reasons why Windows is sweeping the world" it lists "Windows can run applications that offer high-quality output," and what that may mean remains the authors' secret. The *look* of the output, maybe? Those scalable fonts? Ah well, the countdown against which a monster text got assembled no doubt explains its patches of flabby prose.

Such a book runs in slow motion, very slow. By page 42 we've just gotten Windows installed; by page 53 we know how to get in and get out; by page 97 we've mastered "basic concepts," like using the mouse, moving or resizing windows, and what's to be found inside a dialog box.

Still, useful tips abound. "Selected files can be so far down the file contents list

# Enhance your Helvetica.

If your favorite font's short on fractions or other special characters, no problem. With just Altsys Fontographer and your Copy and Paste functions, you can create new letterforms in your favorite fonts (math and scientific symbols, ligatures,

 $\frac{7}{32}$ 

foreign characters, etc.). You can also modify existing characters, and create logos, trademarks and other graphics. Or invent entirely new fonts. Which is why Altsys Fontographer is recognized as the industry standard for type design and font editing.

When you need a fraction, logo, or a foreign symbol in Helvetica or any PostScript® or TrueType™ font, you can create it in minutes with Fontographer.

Call 1-800-477-2131 for limited time special pricing. Macintosh® and Windows™ versions shipping now.



## FONTGRAPHER 3.5

Altsys Corporation, Richardson, Texas 75080  
Call (214) 680-2060 for more information.

that you may not realize they are still selected. It's best to check the file contents list one last time before you do anything unrecoverable." Implying as it does the unfenced edge of a pit, that's a warning Microsoft is unlikely to issue. It's easy to imagine being grateful for it at delete time.

Such is one example, perhaps the biggest, of many big books that pretty well follow the outline of the manual. A commendable exception to their formula is *Inside Windows 3.1*, by Jim Boyce, Forrest Houlette, Ellen Dana Nagler, and Michael Wirsching. The authors have targeted their reader: an experienced DOS user who either is new to Windows or has used only pre-3.1 versions. And they're careful never to waste such a reader's time. The 50-odd pages on DDE and OLE are worth the price of the book. Highly recommended.

Next, the advanced books, the ones that assume you're up and running with Windows but feeling a mite hemmed in. My pick would be Brian Livingston's *Windows 3.1 Secrets*. A no-nonsense "Read This First" chapter spells out a governing truth: "While Windows' cute icons give it an easy-to-use look, anyone who has used Windows for a while has found there's a lot going on underneath the surface that is not explained in the manual."

Also present is a key to four icons, which will be pointing us from the text's margin to Undocumented Features (there must be dozens), Workarounds, Error Messages Decoded (sometimes "the correct response is the exact opposite" of what the screen suggests), and 3.1-Specific Material. A very user-friendly layout, and a book exemplary for usefulness and lucidity. (The shareware on the disks, by the way, includes an effort, strictly for the homesick, to simulate the Mac's Trashcan delete.)

Another advanced book is Ed Tiley's *Tricks of the Windows 3.1 Masters*. It's notable for the attention it pays to programming and for the inclusion on disk of Realizer Limited, a sample version of a program that lets you develop Windows applications with a structured superset of BASIC and bypass all the niggles that raise the C code for just displaying "Hello, world!" from five lines in DOS to some 80 lines in Windows.

Or there's Jim Boyce's *Maximizing Windows 3.1*. Like its less advanced sibling *Inside Windows 3.1*, it's notably direct. "Users should not be deceived by the apparent simplicity of the Windows interface," since customizing it to your requirements "can require a considerable investment of time and energy." That's the investment the book sets out to minimize. It's well organized, lucid, and replete with undocumented tips.

continued

PC MEMORY PROCESSOR & DRIVE UPGRADES

MATH CO-PROCESSORS

WORKSTATION MEMORY

# PS/2 Processor Upgrades...

- 486 upgrades for Models 70 & 80
- 386 upgrades for Models 50, 50z & 60

33 MHz Speed! Zero Slot Solution!

Call 800-446-4525 today for details!

## Σ Sigma Data

THE UPGRADE SPECIALISTS

P.O. BOX 1790, NEW LONDON, NEW HAMPSHIRE 03257 FAX 603-526-6915

LASER PRINTER MEMORY

DRIVE UPGRADES

PC MEMORY PROCESSOR & DRIVE UPGRADES

# The World's Best Selling UNIX Clone Just Got Better.

## Now with full 32-bit implementation!

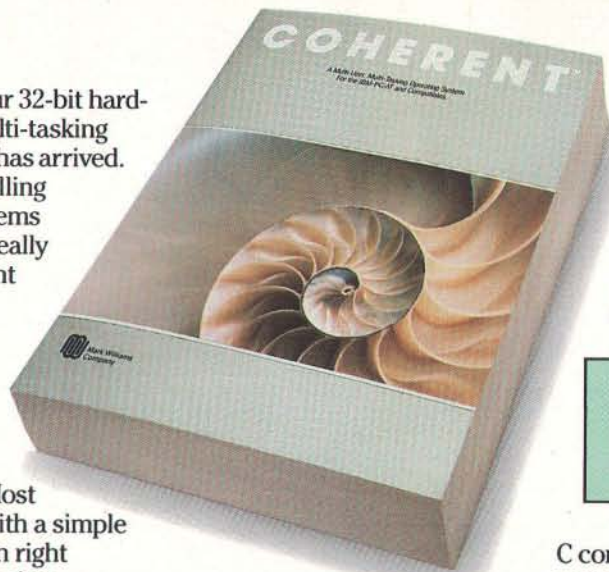
If you want to ignite your 32-bit hardware with the multi-user, multi-tasking power of UNIX, Coherent 4.0 has arrived. And if you're operating or selling small business network systems with dozens of users, that's really good news. Because Coherent 4.0 is what you want in UNIX at a price that's hard to believe.

## Run UNIX applications today!

Coherent is now binary compatible with UNIX. Most UNIX PC applications port with a simple recompile and many now run right out of the box. The list is growing everyday, so call for details.

## Yes, It's For Real!

How can it be? First of all, Coherent was independently developed by the Mark Williams Company, so you don't pay for UNIX licensing fees. You don't pay any mark-up or reseller costs either. Coherent is only sold directly to you.



six disk installation is a breeze compared to their 25. You'll also learn it faster and increase overall performance. All because Coherent is smaller, faster... and better.

## Small, But So Complete.

Make no mistake, Coherent is a wholly professional development system. You get a complete

*"Coherent comes so fully qualified as a UNIX clone, you find yourself thinking, 'I can't believe it's not UNIX.'"—Sean Fulton, UNIX Today!*

C compiler, assembler and over 200 UNIX commands including full sets of functions for development, administration, maintenance and text processing.

Coherent also comes with UUCP capabilities that connect you to a world-wide network of free software, news and millions of UNIX users. And it's all clearly documented in Coherent's highly praised 1200 page manual.

# Coherent.<sup>TM</sup> Still \$99.95.

## Experienced, Supported, Guaranteed.

Mark Williams Company has been developing professional programming tools since 1976. Our commitment to our products and users is unsurpassed. Users applaud our popular BBS and the widely acclaimed telephone support they get free from Coherent developers.

Still, we're not asking you to take a chance on Coherent. We've made it fool-proof to see for yourself—with a 60-day money-back, no hassles guarantee. So pick up that phone and order Coherent now. And the best way to UNIX will be on its way to you!

*"... (Coherent) may be the best thing that has happened to UNIX yet."  
—William Zachmann, PC Week*

In fact, over 40,000 copies of Coherent have already been sold. And, like the ones we quote here, virtually every critic who's reviewed Coherent has raved about it.

## So Much Less, Yet So Much More.

As a virtual clone of UNIX, Coherent embraces the original UNIX philosophy: Small is beautiful. Small price, yes. But there's more, much more, to Coherent than its amazing price.

Requiring only 10 megabytes of disk space, Coherent can reside with DOS. So you can keep all your DOS applications and move up to Coherent. And it runs with as little as 1 MB of memory versus 4 MB for other UNIX versions.

## The World's Only Plug And Play UNIX Clone.

You'll have Coherent up and running with a fraction of the time and effort it takes for other UNIX versions. Our

	MWC COHERENT Version 4.0	SCO UNIX/386 Version 3.2V2
No. of Manuals	1	14
No. of Disks	6	25
Kernel Size	100 K	375 K
Install Time	40 min.	3-4 hours
Suggested Disk Space	10 meg	60 meg
Min. Memory Required	1 meg	2-4 meg
Performance*	85.7	31.3
Price	\$99.95	\$2590

\*Byte C Compiler Benchmark: Compiles per minute on 25 MHZ 486.

**800-MARK WMS**  
(800-627-5967 or 708-291-6700, FAX: 708-291-6750)  
**60-DAY MONEY BACK GUARANTEE!**



**Mark Williams Company**

60 Revere Drive, Northbrook, IL 60062

Coherent is a trademark of Mark Williams Company. UNIX is a trademark of USL.

BOOKS DISCUSSED

*Inside Windows 3.1*, Jim Boyce, Forrest Houlette, Ellen Dana Nagler, and Michael Wirsching, New Riders Publishing, 1992, \$29.95, 545 pp., ISBN 1-56205-038-9.

*Little Windows Book*, Kay Yarborough Nelson, Peachpit Press, 1992, \$12.95, 132 pp., ISBN 0-938151-81-9.

*Maximizing Windows 3.1*, Jim Boyce, New Riders Publishing, 1992, \$39.95, 901 pp., plus two disks, ISBN 1-56205-044-3.

*101 Windows Tips and Tricks*, Scott Dunn, Charles Bermant, and Jesse Berst, Peachpit Press, 1992, \$12.95, 206 pp., ISBN 0-938151-55-X.

*Running Windows 3.1*, Craig Stinson, Microsoft Press, 1992, \$27.95, 526 pp., ISBN 1-55615-373-2 (includes *Concise Guide to Microsoft Windows 3.1*, Kris Jamsa, Microsoft Press, 1992, \$12.95, 195 pp., ISBN 1-55615-470-4).

*Tricks of the Windows 3.1 Masters*, Ed Tiley, Howard W. Sams, 1992, \$44.95, 952 pp., plus three disks, ISBN 0-672-30135-0.

*Voodoo WordPerfect for Windows*, Kay Yarborough Nelson, Ventana, 1992, \$19.95, 359 pp., ISBN 0-940087-97-9.

*Windows 3 Shareware Utilities*, Ed DiGiovanna, Winderest, 1992, \$29.95, 195 pp., plus one disk, ISBN 0-8306-2485-6.

*Windows 3.1: The Pocket Reference*, Allen L. Wyatt, McGraw-Hill, 1992, \$9.95, 216 pp., ISBN 0-07-881824-9.

*Windows 3.1 Power Tools*, Geoffrey and William LeBlond, Bantam, 1992, \$49.95, 1024 pp., plus one disk, ISBN 0-553-35406-X.

*Windows 3.1 Quick Reference*, Timothy S. Stanley, Que, 1992, \$9.95, 150 pp., ISBN 0-88022-740-0.

*Windows 3.1 Secrets*, Brian Livingston, IDG Books, 1992, \$39.95, 990 pp., plus three disks, ISBN 1-878058-43-6.

*Windows Shareware Book*, Michael A. Banks, John Wiley & Sons, 1992, \$39.95, 384 pp., plus one disk, ISBN 0-471-55817-6.

continued

1987-88-90  
U.S. Delivery \$3.00  
Foreign Delivery \$4.00

1990-91  
U.S. Delivery \$6.00  
Foreign \$8.00  
Canada & Mexico \$6.50

	1987	1988	1989	1990	1991	1992
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
Special Issues					Outlook '92	

Issues Available

## BYTE BACK ISSUES FOR SALE

The above prices include postage in the US. European customers please refer to Back Issue order form in the International Advertising section of the book

Please indicate which issues you would like by checking(✓) the boxes. Send requests with payment to:

BYTE Back Issues, One Phoenix Mill Lane, Peterborough, N.H. 03458, (603) 924-9281

Check enclosed      Charge:     VISA     MasterCard

Card # \_\_\_\_\_

Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

All orders must be prepaid. Please allow four weeks delivery

**NEW!**

Northgate™ SlimLine™ Is Back And Faster Than Ever!

**DX2/66**

Available  
Now!

# Northgate Local Bus High Speed Windows And GUI Video – An Industry First!



## Northgate ZXP System With Unlimited Upgradability - Compatible With Intel® SX/25, DX33, DX2/50, DX2/66 And All OverDrives!

**A Northgate Exclusive! No other computer offers this price/performance!**

- Intel 80486SX™/25 MHz processor
- 4MB of RAM; expands to 32MB on board
- Virtual Cache – Zero Wait State Performance
- 100MB hard drive
- 1.2MB or 1.44MB floppy drive
- High-speed local bus VGA with 1MB video RAM
- 1024 x 768 monitor
- MS-DOS® 5.0, Microsoft® Windows™ 3.1 and mouse
- Award-winning Northgate service and support
- 30-day no-risk money back guarantee
- Winmarks (V2.5) of 7.9 million;
- PowerMeiter™ MIPS (V1.7) of 14.8



Call for more information!  
**800-345-8709**



Major corporations, volume purchasers and government agencies call National Business Accounts: 800-545-6059

GSA# GS00K91AGS5193 PS01

Major credit cards, money orders, direct wire and approved company purchase orders accepted.



7075 Flying Cloud Drive, Eden Prairie, MN 55344

**"When it has to work right"™**

©Copyright Northgate Computer Systems, Inc. 1992 All rights reserved. Northgate, SlimLine, ZXP and the Northgate "N" logo are U.S. trademarks or registered U.S. trademarks of Northgate Computer Systems. 80486SX and 80486 are U.S. trademarks of Intel. MS-DOS, Windows and Microsoft are U.S. trademarks or registered U.S. trademarks of Microsoft Corporation. All other products and brand names are U.S. trademarks and registered U.S. trademarks of their respective companies. Prices and specifications subject to change without notice. Prices shown do not include shipping/handling charges and appropriate sales taxes. Northgate reserves the right to substitute components of equal or greater quality or performance. All items subject to availability. We support the ethical use of software. To report software copyright violations, call the Software Publishers Association's Anti-Piracy hotline at 1-800-388-FIR8. All systems shipped with Diagnostics QA Plus™ software. \*\*Monthly lease payments are based on a 36-month standard fair-market value open-ended lease. 12/60 month leasing options available for qualified businesses.

CODE B4609

*Windows 3.1 Power Tools* by Geoffrey and William LeBlond begins by telling us that Windows is "the platform of choice" for power users: people who want to customize the interface, integrate applications, and optimize system performance. Those are things you spend time doing to save time later. I'm coming to think that's a fair perspective on Windows generally: It can be murder to learn, en route to being dreamy to use. But most of us don't need to learn all about it. We'll mostly run the

same software over and over. An accountant juggles a spreadsheet; a writer processes words. So take the time to get your windowed niche optimally comfortable. (The LeBlond book offers much guidance plus a software tool called Oriel.) Then take comfort: All those Windows doodads you are not using need distract you no longer. They're there for other people.

Still, Windows, as Michael A. Banks says, is not perfect, and maybe your niche has shortcomings. Well, a lot of helpful

shareware exists if you can find out about it. His *Windows Shareware Book* surveys available stuff by topics, provides prices and contact addresses, and offers a sampling on disk. Ed DiGiovanna's *Windows 3 Shareware Utilities* describes 15 of the programs in the PC-SIG shareware library; the disk samples a few of them. Of the two books, I'd choose the Banks.

Finally, a few special-purpose items. *101 Windows Tips and Tricks* has the cutest chapter titles going ("When Your Heart Belongs to Data"; "Icon Get No Satisfaction") and useful stuff like "the fastest way to add a whole bunch of Windows apps to ProgMan." It's for poking around in after you're feeling sort-of-expert.

Or, here's Kay Yarborough Nelson again with *Voodoo WordPerfect for Windows*. Subtitled "Tips & Tricks with an Attitude," it offers things that aren't on any menu, such as the quick way to clear the current document (Ctrl-Shift-F4), or the right way to delete items from tables of contents (be sure to take out mark codes also), or how to wrap text around both sides of a graphic (get the book). Her knowledge of arcana is uncanny; she even reports a "Cinderella Bug" in early releases "that won't let you compile a macro between 12:00 and 12:59 A.M. and during the first minute of every hour." Some programmer, she thinks, had fun with that.

Finally, now that you're comfortable with Windows, you have occasional trouble remembering some procedure. So here's Allen L. Wyatt's *Windows 3.1: The Pocket Reference*, filling a need. "Puts all essential Windows features and commands at your fingertips," says the blurb, accurately. Moreover, the spine is alleged not to split if you crack the book flat. Timothy S. Stanley's *Windows 3.1 Quick Reference* fills a similar need with a different organization but has nothing to say about its spine. Take your pick. Mine's the Wyatt.

Whew, what a list. Books are piled all over the floor. And Lord, the hurry that attended their production! I'll not say which author dedicated a book "to Bets, my adoring wife." That's dated Valentine's Day, 1992, our man presumably groggy from key-punching. Not for me to suggest that what he meant was "adored." He may even have meant what he said. Knowing what you really mean is the beginning and end of Windows. ■

*Hugh Kenner is Franklin and Callaway Professor of English at the University of Georgia. He writes for publications ranging from the New York Times to Art & Antiques. His recent books include Mazes and Historical Fictions. He can be contacted on BIX as "hkenner."*

# Complete, Powerful Connectivity

## SmarTerm® 420 for Windows version 2.0



Access multiple host computers, including VAX/VMS and UNIX/Unix host systems, simultaneously. SmarTerm 420 for Windows includes LAT, Telnet, and FTP at no extra charge.

New SmarTerm 420 for Windows version 2.0 clearly puts more VT emulation power and ease at your fingertips. New features include scrollbar, color selection, font resizing, and ANSI color support. Toolbox, button palettes, trace and remapping utilities, and customizable-help reduce support needs. SmarTerm 420 for Windows still offers error-free file transfer, scripting, and keyboard mapping. Plus, you get LAT, Telnet, and FTP at no extra cost. SmarTerm, connecting users worldwide, is also available for VT320 and VT340 emulation using DOS.

Persoft, Inc. 465 Science Dr. P.O. Box 44953  
Madison, WI 53744-4953 Call toll-free 1-800-EMULATE  
Fax (608) 273-8227  
European Headquarters World Trade Ctr. Beursplein 37  
Box 30237 3001 DE Rotterdam The Netherlands  
Phone +31 10 405.3560 Fax +31 10 405.5073

**persoft**  
CONNECTIVITY SOLUTIONS  
DOS • Windows • Ethernet • Token Ring

© 1992, Persoft, Inc. All Rights Reserved.  
Persoft and SmarTerm are registered trademarks of Persoft, Inc. All other trademarks mentioned are properties of their respective owners.





# Discover Your Windows<sup>TM</sup> Higher Purpose With Jameco Upgrades

The overwhelming beauty of Windows<sup>TM</sup> is its ease of use. Inspired as today's tools may be, you will need higher computing power and additional memory. Jameco offers affordable hardware upgrades to maximize your computer's performance.

**Add-on Memory** is essential for Windows performance. Add memory for the computing speed your applications require. Jameco now offers a complete line of name brand modules for laptop and desktop PC and laser printers.

**High-Resolution VGA Monitor and Card** release the full glory of color graphics applications and display screens without delay.

**High-Capacity Hard Disk** lets you install all your application programs while providing space for growing databases.

MS-DOS<sup>TM</sup> and Windows<sup>TM</sup> are trademarks of Microsoft Corporation.

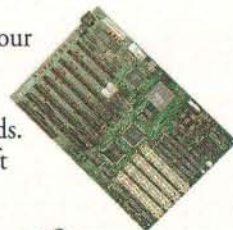


**A New Motherboard** will change your computer into the latest processing technology. Choose from a wide selection of 386 and 486 motherboards. All boards are available with Microsoft MS-DOS V5.0 and Windows V3.1.

**Math Coprocessors** make your calculation-intensive programs really perform. Power up spreadsheets, graphics and accounting programs.

Jameco offers a wide range of products, each warranted and backed by a 30-day full refund guarantee. Telephone our technical support group for expert advice on product selection and installation. Use our toll-free numbers to place an order; ask for our free "1993 Annual Catalog". Discover Jameco's higher purpose: our commitment to you. We've delivered 18 years of customer satisfaction and service.

Call us today.



Call 1•800•637•8471  
for your free  
1993 Annual Catalog.

Order Hotline:  
1•800•831•4242



**JAMECO<sup>TM</sup>**  
ELECTRONIC COMPONENTS  
COMPUTER PRODUCTS

1355 Shoreway Road  
Belmont, CA 94002  
24-Hour Order Hotline:  
1•800•831•4242  
FAX: 1•800•237•6948

Circle 99 on Inquiry Card.

Please  
refer to  
Mail Key 21  
when  
ordering

# SPREADSHEETS UNDER SCRUTINY

**Lotus 1-2-3 for Windows 1.1, Excel 4.0, or Quattro Pro for Windows 1.0—which one's best for you?**

**NICHOLAS DELONAS**

**W**hat do you want in a spreadsheet? Would you rather have the fastest number cruncher or a superslick report publisher? Are you looking for mainframe data access and analysis? Or are sophisticated application development tools more important? Are you a novice or an experienced spreadsheet user? The answers to questions like these determine which of the three heavyweight contenders gets to wear the Windows spreadsheet crown. Lotus 1-2-3 for Windows 1.1 (1-2-3/W), Microsoft Excel 4.0 for Windows, and Quattro Pro for Windows 1.0 all have their strengths and weaknesses.

You'll find a performance comparison for the three programs in table 1. Be aware

that I tested Quattro Pro using the second-to-last scheduled beta version of the product. At the time of my testing, Borland stated that the final version should be somewhat faster loading and with file I/O.

Excel proved to be the fastest overall, but results varied significantly by task. If, for example, printing speed is important to you, 1-2-3/W is a better choice than Excel, although it was the slowest on average.

Both Lotus and Microsoft urged me to use "real-world" applications for testing their products. Of course, they had different ideas about just what that means. Both companies supplied testing ideas, and Lotus even sent a sample file. The Lotus file looked like a commonsense application for calculating the cost of a home pur-

chase. I removed all the extraneous sheets that seemed designed to make Excel look bad. Even so, the resulting model ran much faster in 1-2-3/W than in Excel. The results for that file are shown in table 1 under "Recalc 3-D sheet 2." Lotus apparently wasn't thinking about Borland, however, because Quattro Pro proved to be even faster with that "typical" application.

I eventually tested the products using several files of my own design, including single-sheet (2-D) and multiple-sheet (3-D) applications. The 2-D sheet 1 contained a smattering of most of the cell functions available in 1-2-3 release 2.01; the 2-D sheet 2 included simple summations of long columns and rows of values. The 3-D sheet 1 was an expanded version of the 2-D sheet 1 with a few links between sheets; the 3-D sheet 2 was a modified version of the test file supplied by Lotus. The test file had many links between the sheets, a calculating weak point in Excel that Lotus apparently realizes.

Microsoft suggested that a sort operation would be a good performance measure; that sounded fair enough. The file I used to benchmark sorting contained a 4-column by 5400-row table. All three programs had to sort on two keys. The first key column held multiples of about a dozen unique labels, while the second key column held random values. Predictably, Excel did very well on the test Microsoft suggested was most important.

All test files were in the native file formats for each program. For the loading and scrolling tests, I did a series of runs using a stopwatch and averaged the results. For the other tests, a 1-2-3-style macro recorded start and stop times and ran the test between the two. While this seems like a slight disadvantage for Excel, the execution time for the macro was insignificant.

Besides speed, you need to consider the memory and resources a program requires. Table 2 shows the effect on these after I loaded and unloaded each program with two file situations. In the first case, I loaded each program with one open, blank file. In the second case, I loaded each program with 16 open, blank files to check how efficiently the programs use the Windows MDI (Multiple Document Interface).

Resources are an important commodity in Windows—far more so than memory or disk space. Lotus 1-2-3/W came out on top here. In contrast, Excel showed a real weakness when I opened multiple files, using more than twice as much of the Windows resources.

Lotus 1-2-3/W limits you to 16 open

## BYTE ACTION SUMMARY

### ■ WHAT WINDOWS SPREADSHEETS DO

They bring the spreadsheet metaphor to a GUI. This allows for the inclusion of powerful new visual tools for spreadsheet publishing, data access, and application development.

### ■ LIKES

These products make it easy to exchange spreadsheet data with other Windows programs. Icon bars are handy for automating common tasks. Two of the programs let you drag and drop ranges from one place to another using the mouse. Two also provide short context-sensitive menus that pop up when you press the right mouse button.

### ■ DISLIKES

They use up way too much hard disk space. All require more powerful computers than their DOS counterparts.

### ■ RECOMMENDATIONS

Quattro Pro for Windows is the easiest to use and has the best graphics and development tools. Excel is especially feature-rich and includes many advanced functions not found in its competitors. Lotus 1-2-3/W can connect to the most external data sources and prints the fastest.

### ■ PRICE

Lotus 1-2-3 for Windows 1.1, \$595  
Microsoft Excel 4.0 for Windows, \$495  
Quattro Pro for Windows 1.0, \$495

files. Excel has no such restriction, but it quickly uses up all system resources—I could open only 28 files before exhausting the resources. Quattro Pro also imposes no restriction, and it managed to open 52 files before running out of resources. Speaking of restrictions, table 3 compares the working limits of the programs.

Still, performance and resources aren't the whole story. Table 4 lists a sampling of supported features. While it's handy for checking on specifics that are important to you, it provides no indication of how easy each feature is to use. An operation might require one mouse-click in one product and a long series of commands in another. And just because a product claims a feature, it doesn't mean the feature works well. For example, all three products are DDE-compliant and can function as DDE servers, but Excel usually does a better job of updating links from named ranges if you move those ranges in the source worksheet.

### Substantial Differences

The marketing materials for these products are likely to extol the virtues of icon bars, 1-2-3 macro compatibility, and automatic features such as intelligent formatting and series fill. But all three products share these features and perform them well enough to invalidate them as selection criteria. There are, however, some real differences in the everyday operational features of these products.

For example, the products differ dramatically in the way they cut and paste data. The Excel method is the strangest: When you cut, the current selection does not disappear until after you paste. Also, in both Excel and Quattro Pro, a cut-and-paste moves the formula in such a way that all relative cell references point to the original cells. In 1-2-3/W, the operation is more like a copy where relative cell references change to refer to new cells. Because 1-2-3/W's method works like a copy instead of a move, you can cut a range and paste and repaste that range to many new locations. Excel, on the other hand, clears the Clipboard, so you can paste only once.

Quattro Pro takes a compromise approach. You can cut a range and paste it more than once. The first paste behaves exactly like Excel's paste (a move), and all subsequent pastes behave like that of 1-2-3/W (a copy).

A bigger issue is the way the programs handle multiple sheets in a single file. Both 1-2-3/W and Quattro Pro are true 3-D spreadsheets; Excel is not. Excel ostensibly matches 3-D functionality by letting you save multiple 2-D sheets in a single

SPREADSHEET PERFORMANCE COMPARISON			
<b>Table 1:</b> <i>The products were tested on a Tangent 486/33 with 8 MB of RAM, a 420-MB hard drive with an IDE caching controller (a 2-MB cache), and a Super VGA monitor (but with a Windows VGA driver). All tests used Windows 3.1. (All times are in seconds.)</i>			
	1-2-3	Excel	Quattro Pro
Load program	10.6	5.4	15.3
Open 2-D file	11.4	7.0	6.3
Open 3-D file	14.4	16.9	7.5
Recalc 2-D sheet 1	36.0	12.0	12.0
Recalc 2-D sheet 2	74.0	27.0	26.0
Recalc 3-D sheet 1	248.0	161.0	209.0
Recalc 3-D sheet 2*	11.0	136.0	10.0
Run 1-2-3 r. 2.01 macro	131.0	158.0	340.0
Scroll down 500 rows	76.7	51.2	61.9
Scroll right 256 columns	57.4	75.6	79.5
Sort test (2 keys)	11.0	4.0	9.0
Print range with pictures	293.1	422.6	305.7
Print range with formatting	159.3	183.2	290.7
Print plain range	39.9	96.3	57.3

\* Based on template provided by Lotus Development.

MEMORY AND RESOURCE HANDLING			
<b>Table 2:</b> <i>Opening and closing the same single file or the same 16 files can produce dramatic differences in memory and resource allocations.</i>			
	1-2-3	Excel	Quattro Pro
<b>Program alone</b>			
Memory used (KB)	785	308	1702
Memory not returned (KB)	16	12	35
Resources used	16%	16%	27%
Resources not returned	3%	3%	3%
<b>16 open files</b>			
Memory used (KB)	949	444	1987
Memory not returned (KB)	21	41	54
Resources used	24%	45%	42%
Resources not returned	4%	8%	8%

disk file. That works well unless you really push the program.

As a test, I tried loading a 68-KB WK3 file into all three programs. It was a simple 3-D application with a separate sheet for each week of the year. Each sheet contained a screenful of values and one link to the previous sheet. Not only was Excel unable to load the file, but when I tried to do so, it locked the system. I had to press Ctrl-Alt-Del to unload Excel and get back to Windows. Quattro Pro and 1-2-3/W both loaded the file easily. Of the two, 1-2-3/W used less memory and fewer

Windows resources.

So, while you can link formulas between sheets in an Excel workbook (like a file link), the result is less effective than the same configuration in either of the competitors. How important is this difference? If you doubt you'll ever use more than a dozen sheets in one file (which is a lot), Excel should work just fine.

### Lotus 1-2-3 for Windows 1.1

Lotus 1-2-3 for Windows is at the bottom of the leapfrog cycle. The major releases of Excel and Quattro Pro are more recent.

*continued*

## SPREADSHEET QUANTITIES

**Table 3:** If you're wondering whether that big project might exceed the capacities of one of these spreadsheets, look for their limits here.

	1-2-3	Excel	Quattro Pro
Maximum characters in formula	511	1024	1022
Maximum characters in label	511	254	1022
Maximum number of viewing panes in a sheet	2	4	2
Maximum number of sheets	256	1	256
Maximum sort keys for table sorting	255	3	5
Maximum what-if table variables	3	2	2
Number of cell functions	108	307	116
Number of columns	256	256	256
Number of graph types <sup>2</sup>	60	90	34
Number of macro keywords	86	400+	147+
Number of rows	8192	16,384	8192

<sup>1</sup> Limited by memory. <sup>2</sup> By my count.

Thus, they match and better the most conspicuous innovations introduced in 1-2-3/W (e.g., the customizable icon bar).

Lotus 1-2-3/W is definitely a Windows product. So, for old-time 1-2-3 hackers, this is a new ball game. The Windows version provides a classic compatibility box that lets you use slash commands the same way you did before. But you get the same functionality in Excel and slash-command compatibility via macros in Quattro Pro. Slash commands execute much faster in 1-2-3 than they do in Excel.

Lotus can legitimately claim that the switch from 1-2-3 for DOS to 1-2-3/W is easier than the switch to Excel. Following a recent court ruling, Borland has had to remove its Lotus-like interface, but Quattro Pro still shares many of the same @ functions and macro commands as 1-2-3/W. Quattro Pro does not provide slash-menu compatibility on-screen, but its Windows menus are easy to master.

For users not familiar with spreadsheets, getting started in 1-2-3/W is easy, and the on-line help system is good. The package does not ship with an on-line tutorial. The company does offer a CD-ROM version of 1-2-3/W that ships with an impressive multimedia help system and an animated interactive tutorial.

Lotus 1-2-3/W is the only product that provides context-sensitive help during formula or macro entry. So, if you type @DDB (into a cell and press F1, 1-2-3/W pops up the help page for the double-declining balance formula. Excel doesn't match this great feature, and Quattro Pro provides it only for @ functions.

Aside from the help features, 1-2-3/W offers little to differentiate it from the competition. It lets you select a range either before or after a menu command. In Excel, you must preselect. Lotus 1-2-3/W also offers true 3-D technology (see screen 1), which is an advantage over Excel for some

people. But Quattro Pro offers the same technology with a superior interface. Although Excel doesn't provide true 3-D, its multisheet workbook is easier to grasp than 1-2-3/W's interface, and Excel's system works just as well for all but the most demanding multisheet applications.

If you are planning to go with 1-2-3/W simply because you want to use your old 1-2-3 for DOS files, don't worry about it. All three programs do a good job of importing them. If you want to maintain macro compatibility, all three programs run release 2.01 macros quite well. However, 1-2-3/W provides the only compatibility with the new macro commands in 1-2-3 for DOS release 3.x.

Of the three programs, 1-2-3/W is the least compatible with other file formats. Most of the files it can allegedly import and export must first be translated with a DOS-based translation utility, the same utility that shipped with 1-2-3 release 3.1. On the other hand, 1-2-3/W works well with the rest of Lotus's suite of Windows applications—Ami Pro, Freelance Plus, Notes, and cc:Mail.

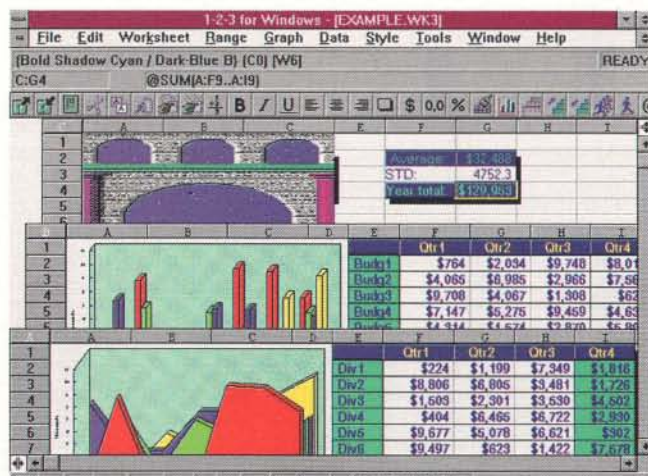
If file compatibility isn't an issue for you, perhaps development tools are. Although Excel provides a more powerful macro facility than 1-2-3/W, it is unquestionably a more difficult language for a nonprogrammer to learn. Also, if you already know the 1-2-3 command language, switching to Excel results in something akin to culture shock. The same is not true with Quattro Pro. As with 1-2-3/W, Quattro Pro's macro language is a superset of 1-2-3 release 2.01's macro language, and a more extensive one at that. Quattro Pro has 1-2-3/W beat on this front.

Lotus 1-2-3/W also includes the same dialog-box editor that ships with Ami Pro, so you can build custom dialog boxes for macro control. This editor is better than the one in Excel, but it's not nearly as good as Quattro Pro's.

Although 1-2-3/W lacks a good way to create macro libraries, something that's easy to do in the other programs, it does provide good file security, and it is certainly possible to create powerful applications using the macro language alone. If you'd like more power, you can develop add-ins (i.e., DLLs) by buying Lotus's Add-in Development Kit for C or Techno-Jock's Advantage for Turbo Pascal.

Finally, 1-2-3/W provides some fairly decent, if hard-to-use, tools for manipulating data. You can perform database joins as in the other products, but 1-2-3/W also has a sophisticated facility for creating what Lotus calls *calculated* (i.e., result of function operating on database fields) and *aggregate* (i.e., alternate cross-tabulation)

**Screen 1:** Lotus pioneered the 3-D spreadsheet technology. Lotus 1-2-3 for Windows is the only spreadsheet program that gives you a perspective view, as shown here. But the same practical functionality is achievable in Quattro Pro and Excel using the Windows MDI.



# Programmer's Paradise®

See us at  
**COMDEX!**  
Booth# H7442

## WindowsMAKER Professional

The fastest way to create Windows applications in C. Generates the Windows .EXE with fully commented source and production files. No royalties. Point and click to define user interface. Preview your design to instantly test look and feel. Make changes on the fly without compiling. Custom code is preserved during code generation. Supports C++. True Visual Programming in C.



List: \$995                      Ours: \$695  
FAXcetera #: 2602-0003

## DataLIB™ 2.0 for Window & DOS The Ultimate Data Import/Export Engine

**NEW PRODUCT!!!** DataLIB is a simple high energy level library that adds sophisticated data import and export capabilities to your application. DataLIB reads and writes Lotus 123, Symphony, Quattro, dBASE, Excel, DIF, SYLK and ASCII - all with a single standard set of functions. Full support for Visual Basic, C & C++, Turbo Pascal, DOS Extenders and other Windows and DOS development environments. ROYALTY FREE!!!



List: \$395                      Ours: \$325  
FAXcetera #: 1004-7201

### GUARANTEED BEST PRICES\*

Should you see one of these products listed at a lower price in another ad in this magazine, CALL US! We'll match the price, and still offer our same quality service and support!

#### Terms of offer:

- \* Offer good through November 30, 1992
- \* Applicable to pricing on current versions of software listed.
- \* November issue prices only.
- \* Offer does not apply towards obvious errors in competitors' ads.
- \* Subject to same terms and conditions

## Development ToolsKan v2.0

Development ToolsKan is a set of six window controls: 3D Chart Table, Status Bar, Toolbox, Ribbon and Field Validation. All modules are written in C and are compatible with Microsoft C/C++ v6.0/7.0, Borland C++ v3.0/3.1 and TPW. ToolsKan can be available individually, in bundles or as a set. With source, royalty free. 30-day money back guarantee.



List: \$1299/Set                      Ours: \$1169  
FAXcetera #: 7119-0010

## WINDOWCRAFT

A powerful easy to use Windows hosted development system for creating Microsoft Windows applications or executing Hypercard card stacks under Windows. An intuitive Design makes it possible for anyone to create responsive and professional applications. With WINDOWCRAFT, it is limited only by your applications.



List: \$295                      Ours: \$215  
FAXcetera #: 3244-0001

## CASE:W C/MFC/OWL

The industry leading Windows development tool now gives you the ability to generate C, MFC C++ and OWL C++ from one product. Interactively design and test your interface with our WYSIWYG visual prototyper then generate the API or class library of your choice. Exclusive features include Help System Generation, MDI Support, Child Windows, Extended Code Support and true Regeneration Capabilities.



List: \$1485                      Ours: \$1150  
FAXcetera #: 2107-0002

## ED The Programmer's Editor

ED is setting the standards for both Windows and DOS environments. ED is your one stop programming productivity tool. Supports C, C++, dBASE, Clipper, DataFlex, and Pascal, among other languages. Under Windows, ED operates as a true Windows application, with an easily accessible icon toolbar to accelerate key functions.



List: \$269                      Ours: \$199  
FAXcetera #: 0233-0011  
DOS—List: \$199                      Ours: \$149

## Exploring Controls Video Course!

This Microsoft University video course helps software developers learn how to implement controls in Windows applications. Upon course completion you'll know how to use buttons, static and edit controls, list and combo boxes, and scroll bars, and create your own custom controls. Technical concepts are visually illustrated through 3-D graphics and reinforced with a student guide and hands-on lab exercises.



List: \$199                      Ours: \$139  
FAXcetera #: 1002-5403

## Essential Graphics Chart for Windows

**VERSION 1.0!** Provides a simple to use yet powerful DLL for adding 2-D and 3-D charts to your Windows applications. By implementing our functions as a DLL, you can use the Chart library from any Windows API compatible language, such as C/C++, Visual Basic and others. Its ease-of-use and variety of chart types will enable you to bring your data to life.



List: CALL                      Ours: CALL  
FAXcetera #: 2089-0020

800-445-7899



**Programmer's Paradise®**

**Your Central Guide to Windows Products!**

**1-800-445-7899**

Corporate: 800-422-6507  
(CORSOFT Division)

columns. The other programs lack capabilities for worksheet-based data tables.

Lotus 1-2-3/W can use external data tables via Lotus's DataLens technology. Out of the box, you get hooks into dBase, Paradox, and SQL (Structured Query Language) server tables. In addition, more than 40 other drivers are available through Lotus and third-party vendors, so you can tie directly into a much wider array of data sources than is now possible with either Excel or Quattro Pro.

### Microsoft Excel 4.0

In many ways, Excel is the odd man out. While Quattro Pro is obviously modeled after 1-2-3, Excel most definitely is not. Oh, Microsoft does borrow ideas from 1-2-3 and routinely copies the features and even the syntax of some add-ins available in the 1-2-3 aftermarket. Still, Excel is a very different animal.

Whereas 1-2-3/W and Quattro Pro use a plus sign to start a cell formula, Excel uses an equal sign. Functions in Excel have no distinguishing starting character; in 1-2-3/W and Quattro Pro, each function begins with an @ sign. But that's not all. In Excel, you separate the end points in a range reference using a colon instead of the double dots of 1-2-3 and Quattro Pro. OK, that's easy, but it might confuse anyone used to 1-2-3 release 3.x, where the colon separates the sheet identification from the cell range. Excel uses the exclamation point for that.

For example, consider the 1-2-3/W formula @SUM(C1..C:E7). The equivalent formula in Excel reads =SUM('[FILE.XLW]A:C'!C1:E7). Note that Excel first identifies the range of sheets, A to C, and then identifies the range of cells, C1 to E7.

While the 1-2-3/W style looks simpler, you're pretty much stuck with it to create multisheet formula references. Unlike 1-2-3/W, Excel lets you name sheets. If you name them March, April, and May, the formula becomes =SUM([FILE.XLW]Mar:May!C1:E7). Excel also lets you use an alternative style of function display that's more like array notation. Under this global option, the formula becomes =SUM([FILE.XLW]Mar:May!RC[2]:R[6]C[4]).

You'll need to learn this last style if you expect to do anything meaningful with the Excel macro language. It may look scary, but it's not hard to master. The R[6]C[4] part of the formula simply says to select the cell that's six rows down and four columns to the right.

Excel also provides a unique formula type called the *array formula*. It lets you enter a single formula for a range of cells. Array formulas can reduce entry time and

## SPREADSHEET FEATURES COMPARISON

**Table 4:** Feature comparison made easy: almost everything you'll ever need to know about 1-2-3/W, Excel, and Quattro Pro. (● = yes; ○ = no.)

General features	1-2-3	Excel	Quattro Pro
Accept Lotus 1-2-3 release 2.01 slash (/) commands	●	●	○
Accept standard date entries without requiring use of function	●	●	● <sup>1</sup>
Access dBase files	●	●	●
Access Paradox files	●	○	●
Access external database tables	●	●	●
Access SQL Server	●	●	○
Add bit maps to graphs	○	○	●
Add graphical images to sheet	●	●	●
Add menu items linked to macro to standard menu	●	●	●
Add-in developer's toolkit available	●	●	●
Adobe Type Manager support	●	○	○
Aggregate columns in data extracts	●	○	○
Interrupt cell entry and switch to another Windows program	○	●	●
Array formulas	○	●	○
Assign macros to graphical objects in sheet	○	●	● <sup>2</sup>
Attach macro to button on sheet	○	●	●
Audit functions	○	●	○
Automatic graph generation	●	●	●
Automatic number formatting based on contents	○	●	○
Automatic number formatting based on reference <sup>3</sup>	○	●	○
Automatic parenthesis completion <sup>4</sup>	○	●	○
Automatic range formatting <sup>5</sup>	●	●	●
Automatic series fill	●	●	●
Automatic database form (dialog box)	○	●	○
Reduce print size to fit on printed page	●	●	●
Autosum multiple columns via icon	●	○	●
Autosum single column via icon	●	●	●
Cascade windows	●	○	●
Cell annotation	●	●	●
Center label across columns	●	●	○
Change 3-D chart orientation	○	●	●
Compatible with Windows 3.1 TrueType fonts	●	●	●
Compute new fields upon data extraction	●	○	○
Context-sensitive help	●	●	●
Create and use named format styles	●	●	●
Create custom cell functions using macro language	○	●	○
Create custom dialog boxes for gathering data	●	●	●
Create custom-cell formats	○	●	●
Create on-screen slide shows	○	●	●
Cross-tabular analysis	●	●	○ <sup>6</sup>
Cross-tabular analysis on external databases	○	●	○
Customizable icon bar	●	●	●
DDE compliant	●	●	●
Discontinuous range printing	●	●	●
Display ruler in worksheet frame	●	○	○
Display text vertically in cells	○	●	○
Drag-and-drop range movement	○	●	●
Edit across sheets (group mode)	○	●	●
Execute 1-2-3 release 2.01 macros without translation	●	●	●

<sup>1</sup> Need to first press Ctrl-Shift-D.

<sup>2</sup> Paste bit map onto a button.

<sup>3</sup> When a formula refers to other cells with a format other than General, it automatically formats current cell with that format.

<sup>4</sup> Enters closing parenthesis if you forget.

<sup>5</sup> Smart format.

<sup>6</sup> May ship in final product.

## SPREADSHEET FEATURES COMPARISON

General features	1-2-3	Excel	Quattro Pro
F1 calls help for function or macro during entry	●	○	○
Float icon bar	●	●	○
Format across sheets (group mode)	●	●	●
Graphical dialog-box builder to create custom dialog boxes	●	●	●
Icon bar	●	●	●
Include returns and tabs in formulas for easier reading	○	●	○
In-sheet graphics not restrained by cell boundaries	○	●	●
Left-align numbers as well as text	○	●	●
Link cell to external file	●	●	●
Macro-record facility	●	●	●
Minimal recalculation	●	●	●
Mix text and graphics on sheet	●	●	●
Model copy	○	○	●
Move and insert cells between other cells (range of cells expands automatically)	○	●	○
Move between sheets in group mode	●	○	●
Move whole sheets in multisheet file	○	●	●
Multimedia tutorial/help system available	●	○	○
Multiple views of same spreadsheet via MDI	○	●	●
Multivariable goal seeking	●	●	●
Name text-format styles for reuse	●	●	○
OLE compliant	○	●	●
On-line tutorial	○	●	○
Outlining	○	●	○
Password: prevent opening of file	●	●	●
Password: prevent saving of file but allow reading	○	●	○
Paste graphics from Clipboard	●	●	●
Preview reports before printing	●	●	●
Print current worksheet range without having to preselect range	●	○	●
Protect cell ranges (disallow changes)	●	●	●
Protect graphical objects (disallow resizing or movement)	○	●	○
Protect windows (disallow resizing or movement)	○	●	○
Radar charts	○	●	○
Read Always format files	●	○	●
Read/write Impress/WYSIWYG format files	●	●	●
Remove standard menu items via macro	○	●	●
Replace standard menus with custom Windows menus	●	●	●
Right mouse button calls short menu appropriate to current selection	○	●	●
Save appearance of spreadsheet workspace (view)	○	●	○
Scalable fonts	●	●	●
Scenario facility	○	●	○
Search and replace	●	●	●
Select discontinuous ranges in sheet	○	●	●
Select whole row or column by clicking border	○	●	●
Single variable goal seeking	●	●	●
Snap icon bar to top, bottom, or sides of screen	●	●	○
Solver technology	●	●	●
Sound-annotation capability	○	●	○
Spelling checking	○	●	○
Tile all windows horizontally	○	●	○
Tile all windows vertically	○	●	○
Tile windows as panes	●	●	●
Toggle between black-and-white and color displays	●	○	○
Translates 1-2-3 r. 2.01 macros to Windows equivalent	○	●	○
True 3-D spreadsheet	●	○	●
Zoom view of worksheet in and out	●	●	●

save memory, and they also come in handy for advanced applications. They're likely to appeal to advanced users while going unnoticed and unmissed by everyone else.

There's a lot in Excel that appeals to advanced users. It is very much a power user's spreadsheet. Microsoft marketers swear up and down that Excel's greatest strength is its ease of use. Don't believe it. While getting started with Excel is certainly easy, getting started with all three products is easy. Excel's easiness ends there, because making the transition from the spreadsheet basics to power use is more difficult than with the other products.

You'd think that Excel would be the prototypical Windows application. But as previously mentioned, the cut-and-paste procedure is anything but typical. Even the copy function doesn't work as expected. When you select Edit and Copy, Excel highlights the selected range. You can then paste multiple copies of the data (unlike with the cut-and-paste procedure). However, if you do something else, like format a cell, Excel erases the contents of the Clipboard. That's most unusual and annoying. Excel also mysteriously lacks the ability to cascade open files—a standard option in most Windows applications. It does provide three ways to tile open files: vertically, horizontally, and as panes.

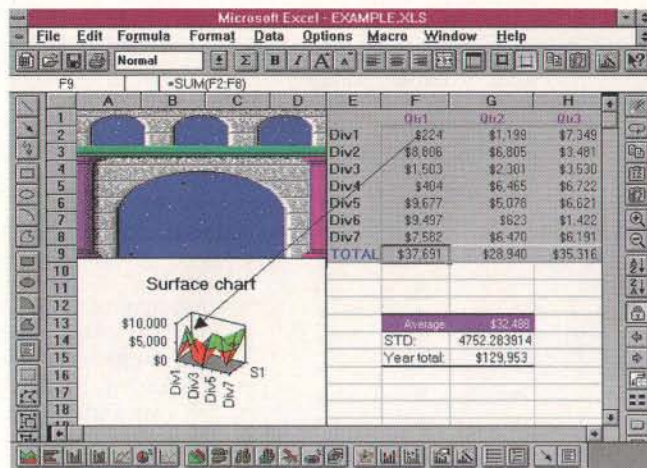
Excel makes it easy to import data. For example, you can quickly enter data in a block of cells. You just select the range and start entering. The cell pointer automatically moves to the next available cell within the block, switching to the top of the next column when you reach the bottom of the current one. This is a great little feature.

An even better one is the Paste Function command. Paste Function pops up a dialog box that lists all the cell functions both alphabetically and by category. When you select a function, Excel prompts you for the arguments. So, if you select NPV, Excel places =NPV(rate,value1,value2,...) in the formula bar and prompts you for the rate argument. You either enter a value or click on a cell that contains one. Then Excel prompts you for the next argument, value1, and so on.

This system isn't perfect because you often don't need to use all the available arguments. Still, it is a feature that beginners and masters alike will love. Most will also appreciate the fact that Excel provides real information in cell-level error messages. Instead of the simple ERR that you get in 1-2-3 and Quattro Pro, Excel provides seven types of error messages to give you a better idea of what went wrong.

Once you've entered your data and formulas, Excel makes it easy to rearrange them. Unlike 1-2-3/W, Excel lets you

**Screen 2:** *Excel has one-upped 1-2-3/W with its icon-bar facility. You can display many icon bars or none at all. You can float them as dialog boxes or snap them to any side of the screen. Excel provides some excellent drawing capabilities that let you draw lines, arrows, and so on over any objects on a sheet.*



select and move a range directly with the mouse. Lotus 1-2-3/W requires clicking on an icon to do the same task—adding one extra mouse-click. That icon keeps 1-2-3/W from looking bad in this case. Icon bars are good for that. They quickly add a lot of functionality, and Microsoft was quick to jump on the icon bandwagon. While Excel's icons aren't as pretty as 1-2-3/W's, they are better organized and thus more practical.

Excel organizes icon bars by type (see screen 2). You get tools conveniently categorized for formatting, charting, drawing, developing, and more. You just click the right mouse button on the current icon bar to pop up a menu of all available icon bars and check all the ones you want to make visible. Once they are visible, you can drag them around with the mouse or snap them to the top, bottom, or sides of the screen. You even have the option of creating your own bars.

In 1-2-3/W, you get only one icon bar. You can add and remove icons from that bar, but this is much less efficient than Excel's method. Quattro Pro also doesn't match the flexibility of Excel's icon-bar facility, although Quattro Pro has a better shortcut menu system than Excel that lessens the need for icons. Both Excel and Quattro Pro offer a great time-saver in the shortcut menus that pop up with a click of the right mouse button. With one click, Excel pops up a small menu of commands that are applicable to the current selection. This is handy, but it's better implemented in Quattro Pro.

On the compatibility front, Excel does well, especially with 1-2-3 files. It opens any 1-2-3 file right from the File | Open dialog box. To translate the file to Excel's format, you choose Save File as Type and select Normal before saving. This is far more sophisticated than anything you can do with 1-2-3/W. Quattro Pro offers a sim-

ilar facility with many more data types, but Excel's is easier to use.

Excel 4.0 also includes a new facility for running old 1-2-3 release 2.01 macros, which works remarkably well. It works better than the same facilities in 1-2-3/W and Quattro Pro, although 1-2-3/W runs the macros faster. Excel is better because of the elegant way it handles old prompting commands like {MENUBRANCH} and {GETLABEL}.

Unfortunately, Excel runs only 2.01-style macros that already exist; you can't create new ones, because there is no way to assign a backslash/letter range name (e.g., \m) and no applicable run command. So, while you could go ahead and write a 2.01-style macro in Excel, you would have no way to run it. You can, however, modify old 1-2-3 macros using 2.01 commands. You also can add calls to new Excel macros from old 2.01 macros.

The fact that you cannot create new 1-2-3-style commands might be important, because Excel macros are completely different from the 1-2-3-style macros found in both 1-2-3/W and Quattro Pro. Excel doesn't make a big distinction between cell functions and macros, the way 1-2-3 does. In Excel, both macro functions and cell functions look pretty much the same.

People used to 1-2-3 macros will have some trouble learning the Excel way of doing things. Undoubtedly, the Excel style of macro programming is much harder for any beginner to learn than the 1-2-3 style. That said, the Excel macro facility is quite powerful. Anyone experienced with Pascal or C is sure to appreciate the Excel way of doing things. Unlike 1-2-3, Excel lets you nest comments and indent lines of code for easier maintainability. The language also encourages a structured approach (more so than 1-2-3), although chaos can still easily reign.

You can use Excel's macro facility to

create your own cell functions and macro add-ins. In fact, many whiz-bang features in Excel (e.g., the scenario manager) are actually macro add-ins. The fact that you can use the macro language to create both cell functions and well-integrated add-ins is a big plus for serious applications developers.

You can use the macro language to change the Excel environment pretty seamlessly. From a user's point of view, there is not much difference between an add-in written using C and one written using macros. You can easily make your custom cell functions and macros a regular part of the spreadsheet, because Excel automatically loads any worksheets, workbooks, macro sheets, charts (graphs), or add-ins that are stored in a special subdirectory called \XLSTART. Excel also provides a dialog-box editor that lets you graphically create custom dialog boxes for use with your macros. However, Excel's editor is the weakest of the three programs.

You get the same types of in-sheet data-manipulation facilities in Excel as in 1-2-3/W. Excel has a special dialog box, reminiscent of Lotus Symphony's Form environment, that lets you browse a database a bit more intuitively than is possible in Quattro Pro and 1-2-3/W.

Excel includes Pioneer Software's Q+E for accessing external data tables. Q+E is a decent, though separate, program. Excel supplies an add-in that lets you get to the features of Q+E directly from the spreadsheet. Q+E provides access to tables in ASCII, dBase, DEC Rdb, Excel, Oracle, and SQL Server. You can purchase additional drivers from Pioneer.

### Quattro Pro for Windows 1.0

Quattro Pro for Windows is the most recent of the three spreadsheet programs. The test version I used had several crashing bugs, but Borland is aware of them, and I assume that the final version won't have these otherwise damning problems.

Although it's not as feature-rich as Excel, Quattro Pro is one slick product, and it's better integrated than either of the other programs. While Excel carries lots of punch, it feels like a patchwork of functionality—as if Microsoft added layer after layer onto some original core of code. That's OK, but some layers don't seem to fit cleanly. Lotus 1-2-3/W suffers from the same problem—it feels as if the Windows interface had simply been placed on top of 1-2-3 for DOS 3.1. In contrast, Quattro Pro feels fresh, tight, solid, and new.

The big news with Quattro Pro is the notebook interface. Quattro Pro provides the same advanced 3-D technology available in 1-2-3/W in an easy-to-understand

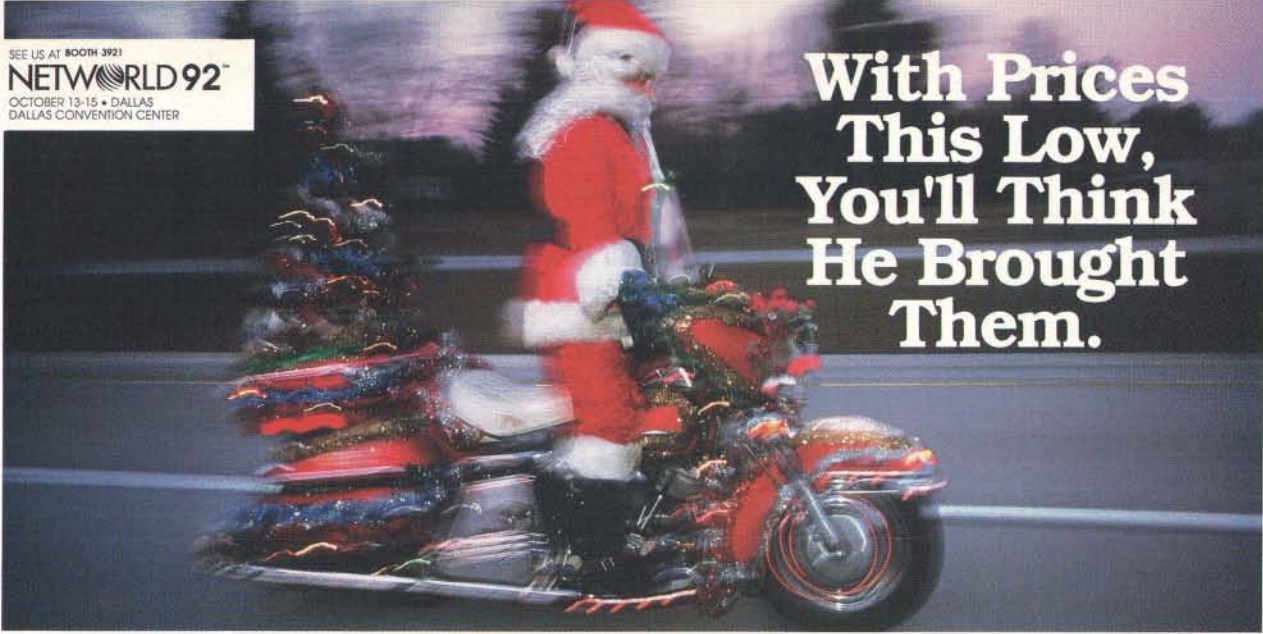


SEE US AT BOOTH 3921

**NETWORLD 92™**

OCTOBER 13-15 • DALLAS  
DALLAS CONVENTION CENTER

**With Prices  
This Low,  
You'll Think  
He Brought  
Them.**



**25-MHz  
i386SX™**  
THE ALR PowerFlex  
FLYER 3SX/25

i386SX CPU running at 25-MHz, upgradeable to 20- or 25-MHz i486SX™, 1-MB RAM, integrated Super VGA graphics (1024 x 768), 60, 80 and 120-MB hard drive options



**20-MHz  
i486SX™**  
THE ALR PowerFlex  
FLYER 4SX/20

i486SX CPU running at 20-MHz, upgradeable to 25-MHz i486SX, 1-MB RAM, integrated Super VGA graphics (1024 x 768), 60, 80 and 120-MB hard drive options



**33-MHz i486DX**  
THE ALR FLYER 32DT 4DX/33

i486DX™ CPU running at 33-MHz, upgradeable to 66-MHz i486DX/2, 4-MB RAM, integrated Super VGA graphics (1024 x 768), 80 and 120-MB hard drive options



**25-MHz  
i486SX**  
THE ALR FLYER 32LCT  
4SX/25

i486SX CPU running at 25-MHz, upgradeable to 33- & 50-MHz i486DX, 50- & 66-MHz i486DX/2, 4-MB RAM, Super VGA graphics 120, 340 and 535-MB hard drive options, 5 Security Features, 10 Expansion Slots, 12 Expansion Bays



**33-MHz  
i486DX**  
THE ALR BusinessVEISA  
486/33

i486DX CPU running at 33-MHz, upgradeable to 50-MHz i486DX/2 and i486DX processors, 32-bit EISA bus, 1-MB RAM, 120 and 200-MB hard drive options



**\$699**

**\$995**

**\$1399**

**\$1795**

**\$1995**



**66-MHz  
i486DX/2**  
THE ALR FLYER 32DT  
4DX2/66

i486DX/2™ CPU running at 66-MHz, 4-MB RAM, integrated Super VGA graphics (1024 x 768), 120 and 200-MB hard drive options



**66-MHz  
i486DX/2**  
THE ALR FLYER 32LCT  
4DX2/66

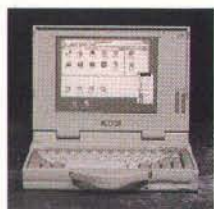
i486DX/2 CPU running at 66-MHz, 4-MB RAM, integrated Super VGA graphics (1024 x 768), 120, 340 and 535-MB hard drive options, 5 Security Features, 10 Expansion Slots, 12 Expansion Bays

	ALR	AST®
Processor	FLYER 32DT 4DX/33	Bravo™ 4/33
Upgrade Path	33-MHz i486DX Intel 486DX2/50, & 486DX2/66	33-MHz i486DX 486DX2/66
Bus Architecture	16-bit ISA	16-bit ISA
Std. RAM	4-MB	2-MB
Std. Graphics	Super VGA	add 2-MB \$160
Std. Video RAM	1-MB	Super VGA 256-KB add 256-KB Video RAM \$15
		Can not upgrade to 1-MB. You have to buy a video controller
Std. Resolution	1024 x 768 x 256	800 x 600 x 16 with upgrade 1024 x 768 x 16
Expansion Slots	Six	Five
Starting Price	\$1,399	\$1,695
After additions	\$1,399	\$1,970



**33-MHz  
i486DX**  
THE ALR POWERPRO VM  
486/33

i486DX CPU running at 33-MHz, upgradeable to 50-MHz i486DX/2 and DX processors, Dual Processor Ready, 32-bit EISA bus, 5-MB RAM, 340 and 535-MB SCSI hard drive options



**25-MHz  
i486SX**  
THE ALR Ranger M486

i486SX CPU running at 25-MHz, upgradeable to 25-MHz i486DX processor, 9" diagonal LCD screen, VGA graphics, Up to 5 hours possible life, 82-key keypad; 4-MB RAM, 60-MB hard drive; 80- & 120-MB options

**\$2199**

**\$2795**

And ALR also offers the convenience and security of on-site service for as little as \$9.95\* a year!

ON-SITE SERVICE



**CALL NOW!**  
ALR's PrimeLine Direct  
**1-800-444-4ALR**

**ALR**  
Advanced Logic Research, Inc.

Irvine, CA 92718 TEL: (714) 581-6770 FAX: (714) 581-9240  
In Canada call 1-800-465-5979

Available Nationwide at these locations

ComputerLand Connecting Point™ 211 ENTRE TCC ALR Power Partner Resellers

Prices and configurations subject to change without notice. Systems shown with optional equipment. Verify exact specifications with ALR. Prices based on U.S. Dollars. ALR is a registered trademark of Advanced Logic Research, Inc. All other brand and product names are trademarks or registered trademarks of their respective owners. Intel Inside is a trademark of Intel Corp. In order to take full advantage of the ALR MPTUS Controller, multiple drives and multitasking operating systems such as Novell's NetWare are necessary. ©1992 by Advanced Logic Research, Inc.

Circle 64 on Inquiry Card  
(RESELLERS: 65).

## BYTE Reprints



### The BYTE Reprint

Department will provide free quotations for reprints of BYTE articles.

Reprints can serve as high quality, inexpensive promotional tools:

- Train and educate key personnel
- Present information at conferences/seminars
- Provide literature to users of your products

Call

**603-924-2525**

for information and a free price quotation.

Minimum order: 500



user interface that looks like a notebook with page tabs at the bottom. This design is far superior to the multisheet interfaces provided in either 1-2-3/W or Excel.

You can treat sheets just like any other object. A right mouse-click on any tab pops up a property inspector for that whole sheet (like Excel's shortcut menu, only better). Press the left mouse button on a page's tab, and you can drag that page to move it anywhere else in the notebook.

This ability provides some interesting possibilities for scenario analysis. For example, you could create a section of pages with summary formulas shown on the cover page and drag pages containing alternative investment possibilities into and out of that series of pages, instantly seeing the effect on the return.

Like Excel, Quattro Pro lets you name pages, which makes formulas that refer to multisheet ranges much easier to read. For example, if you were to name 12 sheets for the months of the year, a typical formula covering the first quarter might read @SUM(Jan:B1..Mar:B12) instead of the cryptic @SUM(A:B1..C:B12) that you'd get in 1-2-3/W. But Quattro Pro doesn't stop there. You can change the global formula syntax from the 1-2-3 style to an Excel-like, alternative style. The result is the more intuitive @SUM(Jan..Mar:B1..B12).

Even better, you can use Quattro Pro's very advanced group-mode features to name those three pages Quarter1. Even when group mode is off, @ functions recognize group names, so the summation formula becomes even clearer and reads @SUM(Qr1:B1..B12).

Quattro Pro beats Excel with its "drag-and-drop" facility. In Quattro Pro, you select a range and hold down the left mouse button anywhere on that range to drag it to a new location. In Excel, you have to click on the thin border of the range before dragging, making it a more delicate operation.

Excel does let you drag and drop a single cell, though, while Quattro Pro does not. This is a flaw that Borland should fix in the next release, perhaps with a double-click select.

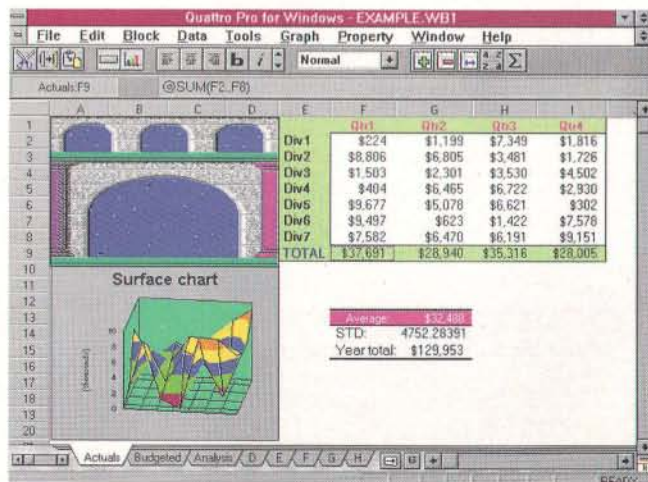
Whereas 1-2-3/W with DataLens and Excel with Q+E can both access dBase files, Quattro Pro goes much further and lets you load a dBase file right into the spreadsheet from the File Open dialog box. You get the file right there in the worksheet, where you can examine and edit it. Choose File and Save, and Quattro Pro saves your edits in the original dBase format. You also can readily translate to any of the other supported formats. This is an example of Quattro Pro's tight integration.

Quattro Pro's graphics capabilities are outstanding (see screen 3). As in Excel, you can place graphics images in a screen show that uses effects such as fades and wipes. Excel lets you place textual information from the spreadsheet into its screen show; Quattro Pro does not. Excel also lets you attach sound to images if you have the requisite multimedia hardware. But Quattro Pro's screen show is easier to use, and the resulting visuals are better.

Quattro Pro provides a familiar superset of the 1-2-3 release 2.01 command language. Experienced 1-2-3 users will feel right at home and will quickly pick up the new commands for dealing with the Windows environment. There's also a macro debugging facility that's superior to what you get in either of the other programs. It lets you set watches, breakpoints, and more. Developers will love it.

As in all the programs, you get a dialog-box editor, but the similarity ends there. UI Builder is actually part of Quattro Pro, and not an external program. It is more attractive than its counterparts, offers more tools, and is easier to use. It even lets you connect objects in the dialog box with objects on a worksheet just by

**Screen 3: Quattro Pro's graphics are super, and the notebook metaphor is a wonderful innovation. To move to a separate page, you just click on any tab. Each tab is a full spreadsheet of 256 columns by 8192 rows.**



# Why do they call it a dongle?



He wasn't famous. He didn't drive a fancy car, but dressed in his favorite Comdex T-shirt and faded blue jeans, he set out to change the course of the computer software industry. Quite a task for a lonely software developer.

Sitting in front of his computer, drinking pots of coffee and smoking cartons of cigarettes, he'd write pages of code.

It took time. Years in fact. But he did it. He wrote the most powerful computer program in the world. Now came the hard part. Selling it.

## The Most Powerful Program in the World

Determined to make those long years pay off, he called on every distributor, VAR and dealer in the world. He drove from Beantown to San Diego. Flew from Dublin to Borneo. Everyone loved the program.

So he sold a few. Only a few.

Back in Boston he waited. After a long year

with only 13 orders he set out to see what happened. As he drove across the country and flew around the world he discovered everyone knew about his program. Everyone had it too.

## The Global Marketplace

From Paris to Prague, his program was everywhere in Europe. When he got off the plane in Hong Kong he found his program stacked to the ceiling in every computer store. Amazed in disbelief, he bought a hundred cartons of cigarettes and a hundred pounds of Indonesian coffee and flew back to Boston.

Beaten, battered and bruised he went back to the drawing board. This time he would really change the face of the software industry. He would develop a device that would prevent unauthorized distribution of software programs.

## Call it What You Like

He developed a hardware key. His peers applauded his efforts. Finally, a solid solution for revenue protection.

But he didn't know what to call it. He thought of naming it after an exotic place he visited in his travels. Madagascar was a bit too long, though.

"Name it after you, Don!", urged his peers. So he did. Soon everyone was calling the key a dongle, after Don Gall—the lonely software developer who did what he had to do.

## You've Come A Long Way, Baby

Today, dongles are different. Fact is, they've come a long way. Leading the industry with security solutions, Rainbow Technologies has changed the face of hardware keys. They work with multiple applications, and network versions control concurrent usage. And they're always transparent to the end-user.

## Sentinel Family from Rainbow

Truth is, more and more developers are using keys. And the Sentinel Family is the most widely used in the world. In fact, over 6,000

developers use Sentinel from Rainbow. Why? They are simply the most effective, reliable and easy to implement keys on the market.

Learn more about securing

your software and how keys provide developers with extra value. Call for a free copy of "The Sentinel Guide to Securing Software." And see just how easy it is to

install a hardware key into your application in just minutes. Try it with our low cost Sentinel Evaluation Kit. Order one for your DOS, OS/2, Windows, Macintosh or UNIX based application.

And remember, when you need a dongle, you need Sentinel—the only dongle Don Gall would use.

European Headquarters  
**44 0932-570066**

Pacific Rim/Latin America Headquarters  
**714/ 454-2100**

Distributors located worldwide.  
Call for a distributor near you.

**SENTINEL**  
Securing the future of software

**Some call it a dongle. Those who know, call it Sentinel.**



### NORTHERN EUROPE

4 The Forum, Hanworth Lane  
Chertsey, Surrey, KT16 9JX, United Kingdom  
tel: 44 0932-570066 ■ fax: 44 0932-570743

### CENTRAL EUROPE

Oskar-Messter-Strasse 16  
Postfach 1243, D-8045 Ismaning, Germany  
tel: 49 089-961 3051 ■ fax: 49 089-961 2617

### SOUTHERN EUROPE

2 Allée des Aulnes  
78190 Trappes, France  
tel: 33 1 3050 4411 ■ fax: 33 1 3050 6276

### PACIFIC RIM/LATIN AMERICA

9292 Jeronimo Road  
Irvine, California 92718  
tel: 714/454-2100 ■ fax: 714/454-8557

CALL FOR YOUR FREE GUIDE TO SECURING SOFTWARE

Circle 118 on Inquiry Card (RESELLERS: 119).

## A MESSAGE To OUR SUBSCRIBERS

**F**ROM TIME TO TIME WE make the BYTE subscriber list available to other companies who wish to send our subscribers material about their products. We take great care to screen these companies, choosing only those who are reputable, and whose products, services or information we feel would be of interest to you. Direct mail is an efficient medium for presenting the latest personal computer goods and services to our subscribers.

Many BYTE subscribers appreciate this controlled use of our mailing list, and look forward to finding information of interest to them in the mail. Used are our subscribers' names and addresses only (no other information we may have is ever given).

While we believe the distribution of this information is of benefit to our subscribers, we firmly respect the wishes of any subscriber who does not want to receive such promotional literature. Should you wish to restrict the use of your name, simply send your request to the following address.

**BYTE** Magazine

Attn: Subscriber Service  
P.O. Box 555  
Hightstown, NJ 08520



## SPREADSHEETS UNDER SCRUTINY

pointing and clicking.

Such wonders clearly make Quattro Pro's macro development tools superior to 1-2-3/W's. But are they better than Excel's? Well, it's a toss-up. Quattro Pro's tools for actually creating macros and dialog boxes and then debugging them are definitely better. But Excel lets you do things like write custom functions (@ functions), which is not possible in Quattro Pro. Excel is better for creating custom libraries of functions that integrate seamlessly into the product. While Quattro Pro lets you designate a notebook as a macro library, the code security that's so important to developers isn't as good as in Excel.

Quattro Pro provides a data-access facility similar to Q+E called Database Desktop. DD is really a front end to the Paradox engine, which ships with Quattro Pro. So all the data-access, client-server, and data-integrity features inherent in Paradox come with it. This also means that Paradox users can regain disk space by simply keeping one copy of the PXENGWIN.DLL in the Windows system directory to serve both Quattro Pro and Paradox.

DD has a graphical interface, including an icon bar, and is easier to use than Q+E. As in Paradox, DD lets you query by example. Like Q+E and Excel, DD feels slightly disconnected from the rest of the spreadsheet program, and it uses slightly different syntax for wild cards (the Paradox syntax) in queries. You can't use all the standard data-query and database-cell functions on the external data the way you can in 1-2-3/W. But the biggest weakness is that out of the box, DD connects only with dBase and Paradox files—far fewer than either of its rivals.

Still, the fact that Quattro Pro uses the Paradox engine to connect with data is interesting. Rather than a mere link to requester drivers, Quattro Pro links directly with the database engine itself. This means that as Paradox gets better, so, too, will Quattro Pro's data-access facility. Borland claims that links from the Paradox engine to other data sources, such as SQL Server, are now in development.

Of course, if you can't wait, you could develop your own data connections. Quattro Pro, like its counterparts, provides an add-in development kit. It lets you create custom add-ins (i.e., @ functions), although it's currently not possible to create a custom macro keyword.

### Recommendations

There are plenty of good reasons for choosing any one product over the others. If you require access to an unusual data source, Lotus may be the only company with an available driver. If you want on-line train-

ing, the multimedia version of 1-2-3/W may be the way to go. You may also want to go with 1-2-3/W if you use any of Lotus's other Windows products or if your company has a particularly good relationship with Lotus. Lotus is investing heavily in its next major release, 1-2-3/W 2.0. However, 1-2-3/W is clearly behind in the GUI spreadsheet war for now.

Much of the same reasoning applies when choosing between Quattro Pro and Excel. Users of Microsoft Mail, for example, have a good reason for favoring Excel, because it provides ties to that mail system. Excel also provides more features than Quattro Pro. If, for example, you are planning to perform sophisticated statistical analysis, Excel provides good tools for that today, although all three products will surely provide similar tools next time around.

Your best bet is to sit down with Excel and Quattro Pro to discover which of these power horses works better for you. I think Quattro Pro for Windows is the best product overall—at least for now. ■

*Nicholas Delonas is a consultant based in Boston, Massachusetts. He is coeditor of The Spreadsheet Consultant, a newsletter for spreadsheet power users. You can contact him on BIX as "ndelonas."*

### COMPANY INFORMATION

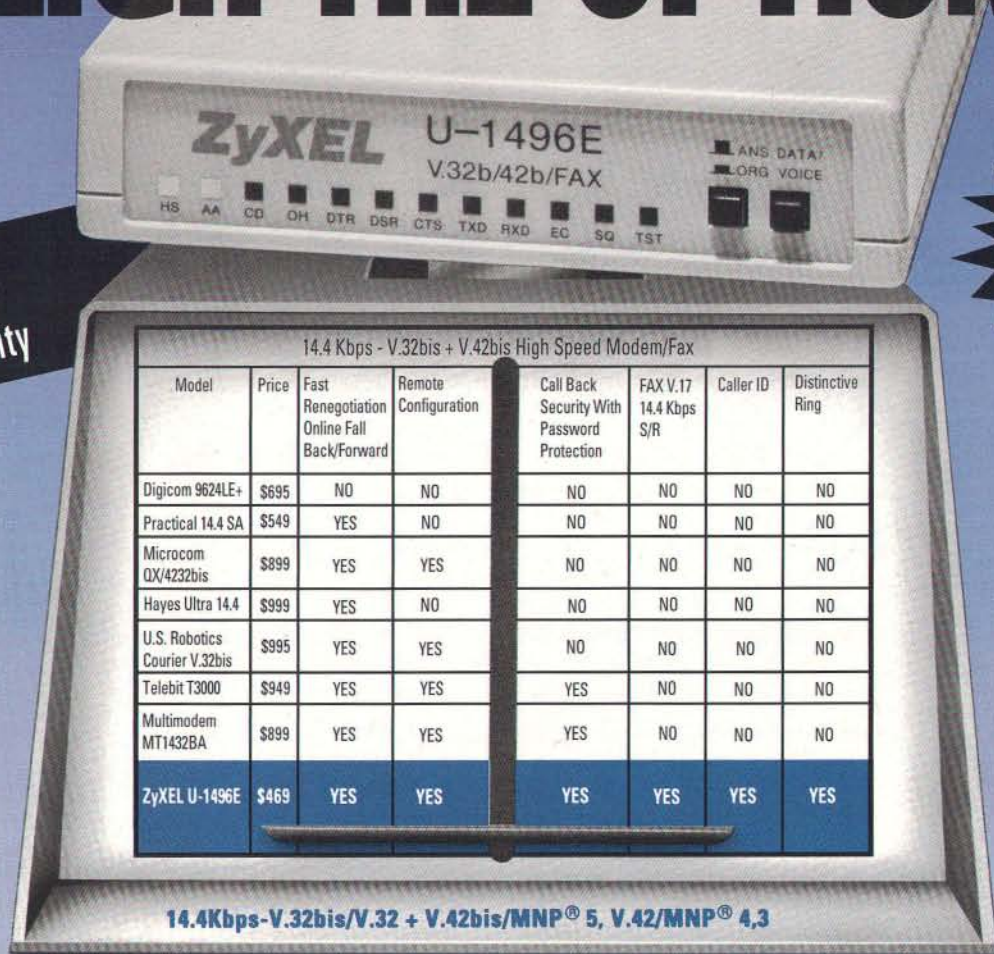
**Borland International, Inc.**  
(Quattro Pro for Windows 1.0)  
1800 Green Hills Rd.  
P.O. Box 660001  
Scotts Valley, CA 95067  
(800) 331-0877  
(408) 438-8400  
fax: (408) 438-0839  
**Circle 1168 on Inquiry Card.**

**Lotus Development Corp.**  
(Lotus 1-2-3 for Windows 1.1)  
55 Cambridge Pkwy.  
Cambridge, MA 02142  
(800) 343-5414  
(617) 577-8500  
fax: (617) 253-9150  
**Circle 1169 on Inquiry Card.**

**Microsoft Corp.**  
(Microsoft Excel 4.0 for Windows)  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329  
**Circle 1170 on Inquiry Card.**

# WEIGH THE OPTIONS

Now with  
16.8 Kbps &  
Voice Capability



**ONLY!**  
**\$469**  
Also Available:  
PC Plug-In Card  
U-1496 B \$449

14.4 Kbps - V.32bis + V.42bis High Speed Modem/Fax							
Model	Price	Fast Renegotiation Online Fall Back/Forward	Remote Configuration	Call Back Security With Password Protection	FAX V.17 14.4 Kbps S/R	Caller ID	Distinctive Ring
Digicom 9624LE+	\$695	NO	NO	NO	NO	NO	NO
Practical 14.4 SA	\$549	YES	NO	NO	NO	NO	NO
Microcom QX/4232bis	\$899	YES	YES	NO	NO	NO	NO
Hayes Ultra 14.4	\$999	YES	NO	NO	NO	NO	NO
U.S. Robotics Courier V.32bis	\$995	YES	YES	NO	NO	NO	NO
Telebit T3000	\$949	YES	YES	YES	NO	NO	NO
Multimodem MT1432BA	\$899	YES	YES	YES	NO	NO	NO
<b>ZyXEL U-1496E</b>	<b>\$469</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>

14.4Kbps-V.32bis/V.32 + V.42bis/MNP® 5, V.42/MNP® 4,3

## The features you want in a High Speed-14.4Kbps Modem/Fax. At nearly half the Price!

ZyXEL's U-1496E offers all the standard features available in a 14.4Kbps- V.32bis+V.42bis modem/fax with DTE speeds up to 57.6Kbps. But you'll also find features you'd expect in only the "top-of-the-line" modems. So why pay more for the features you want, when you can get the best value from ZyXEL for less?

### Caller ID/Distinctive Ring

Displays the caller's phone number, time and date stamp directly on your screen, and responds to the distinctive rings for incoming fax or modem calls.

### Enhanced FAX

14.4Kbps G3 fax with automatic detection of fax or modem calls. Automatically receives, stores and/or prints faxes with our FREE ZFAX software.

### Automatic Fast Rate Renegotiation

Online automatic speed fall-back/fall-forward allows the highest throughput achievable during poor line conditions.

### Multi-Level Security

Security password protection and automatic call-back features are designed so only authorized callers can access your system.

### Nonvolatile Memory Storage

Store up to 4 user configuration profiles in NVRAM, plus up to 10 user phone numbers and their associated passwords.

### Software/System Compatible

Supports V.25bis autodial and enhanced AT Command Set, ensuring compatibility with popular communications/fax software. Available with MAC™, Windows™ and DOS fax software packages.

### Guarantees

We offer a Full 5 year Parts and Labor Warranty, a 30 day money back guarantee and full BBS technical support line.

Once you've weighed the options, you'll agree: ZyXel's U-1496E offers the best value for less than any other modem/fax in its class. So, don't hesitate. **Call Today.**

**ZyXEL USA**

**(800) 255-4101**

Reseller discounts available

TEL (714) 693-0808  
FAX (714) 693-0705  
BBS/Tech.Support  
(714) 693-0762

Visit us at COMDEX FALL '92 - North Hall #4644

ZyXEL USA, 4920 E. LaPalma Ave., Anaheim, CA 92807

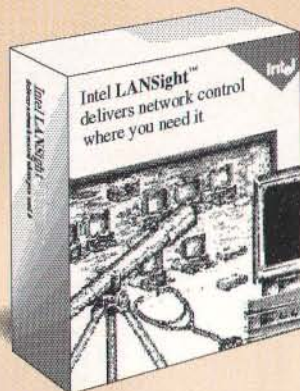
All brand names and trademarks are the property of their respective owners. Comparison chart was completed in May, 1992.

Circle 147 on Inquiry Card (RESELLERS: 148).



Editor's Choice: ZyXEL U-1496E  
German Edition, 4/92

# To Manage and to Protect: NetWare LAN Care in 2 Packages from Intel



**LANSight™**  
software for  
**Windows:**  
**Node**  
**Management**  
**at Your**  
**Fingertips**

**M**anaging today's local area networks (LANs) demands a lot more than checking network cabling and verifying an adapter card's integrity. Users raise a staggering variety of software and hardware-specific problems that require sophisticated problem-solving skills in addition to a well-stocked node-management toolkit.

Only LANSight v3.0 for Windows effectively delivers all the LAN management tools you need in a single, low-priced package. You get:

- View, diagnose, and remotely configure workstations and file servers
- Button bar of common network diagnostics and configuration management functions
- Remote access to any addressable node
- Lowest memory requirements at user workstation (6K TSR)
- Enhanced security to prevent unauthorized access

The richness of LANSight's tools helps you accomplish your main objectives: minimum network downtime, maximum personal productivity.



#### System Requirements LANSight for Windows

NetWare 2.x or 3.1x versions or greater, 512K of RAM, 6K RAM on each workstation where TSR is installed. LANSight package also includes complete DOS interface. Single-Server Version (SLAN1225).

LANSight and LANSight are trademarks and Intel is a registered trademark of Intel Corporation. Other trademarks used by reference are the property of their holders.

List: \$395

**The Shop: \$345**

FastFaxes 1261-072  
(Product Information via Fax)  
Call: 617-740-0025



**LANProtect™**  
software v1.5:  
**No better**  
**protection**  
**against viral**  
**infection**

**L**ANProtect offers Novell-certified technology that continuously shields your LAN from viruses. It scans all susceptible events and prevents known viruses from getting on the server from all points: workstations, modem servers, and server-to-server file transfers. And it detects and quarantines polymorphic (unknown) viruses with rules-based methods.

Whenever LANProtect finds a virus it notifies you, tracks these encounters by network ID, workstation ID and user ID and makes its updated virus pattern library available to all LANProtect file servers across your wide area network (WAN).

#### LANProtect offers:

- Server-based (NLM) continuous scanning
- DOS, Windows, Macintosh and OS/2 support
- New! Rules-based polymorphic and stealth virus detection
- New! Virus removal
- New! Remote configuration management of other LANProtect
- Network reporting and notification
- New! Optional 3K TSR for continuous workstation protection
- Secured with 2 levels of passwords LANs are a natural entry point for viruses. Give yours the best protection available on the market. LANProtect v1.5.



**intel**

#### System Requirements for LANProtect v1.5

NetWare 3.1x, 275K RAM at file server, 3K RAM on each workstation where TSR is installed. Unlimited virus pattern library updates are available free of charge from Intel's electronic BBS or on CompuServe. Single-Server Version (SLAN1218), 20-Server Version (SLAN1218-20). Novell certification means that LANProtect tracks all NetWare activity with no interruptions to standard NetWare functions. NCSA certification of LANProtect means that LANProtect catches known viruses with no false alarms.

List: \$995

**The Shop: \$939**

FastFaxes 2799-061  
(Product Information via Fax)  
Call: 617-740-0025

To Order Call **THE SHOP** PROGRAMMERS 1-800-421-8006

NEW

# Introducing CBTREE for Windows™!

**Our full function B+tree ISAM access method  
is in use by thousands of C programmers  
in the DOS and Unix environments.**

Take advantage of Windows' hot development environment by using CBTREE's Dynamic Link Library (DLL) Windows interface. CBTREE provides a full function ISAM implementation of the highly regarded industry standard B+tree access method.

### Easy to Learn and Use

It's extremely easy to build a CBTREE application. CBTREE's flexibility can help you develop and maintain your custom database applications. This programming tool provides you with complete indexed data file management in the Microsoft Windows 3.x environment.

### Both Windows and DOS

CBTREE provides true Windows programming support. In addition, you can develop new and innovative applications in Windows while maintaining data file compatibility with DOS. You'll use the same CBTREE interface to develop applications in Windows and DOS.

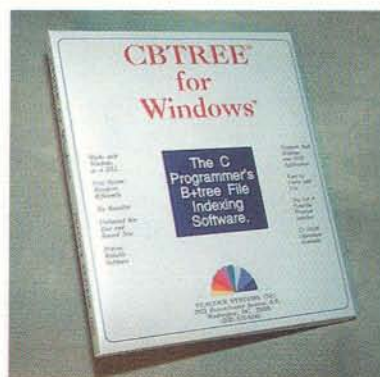
### You Get A Powerful Program Interface

Now CBTREE provides full support for Microsoft Windows development both as a static library and as a Dynamic Link Library. CBTREE.DLL is finely tuned for the Windows environment and offers these benefits to Windows programmers:

- Facilitates developing complex applications.
- Saves you valuable time because application components are more easily updated.
- Less system memory is required by your applications.
- Saves disk space used by your applications.

CBTREE uses super-fast RAM caching of index nodes, making CBTREE simply the fastest ISAM file system available. And CBTREE is not complicated to use. Other important features include:

- Multiple key types
- Indexes can be created on the fly
- Supports both unique and duplicate keys
- Block retrieval calls enable both forward and backward paging
- B+tree compactor to compact the index files, improving disk space usage and performance
- Fasttree function that builds large indexes FAST from sorted key input
- Fixed and variable length records
- Unlimited key size
- Unlimited record size
- Automatic index balancing
- Support multiple indexes in a single file
- Efficient use of memory—



**PEACOCK SYSTEMS, INC.**

dynamic allocation

- User defined keys and functions to build keys
- Multi-user and network applications through record locking

### No Nonsense Licensing

CBTREE includes 100% C source code and is ROYALTY FREE. You can also freely distribute CBTREE.DLL with your applications.

As always, CBTREE includes Free Technical Support with an unconditional 30-day MONEY BACK GUARANTEE.

List: \$349

**The Shop: \$249**

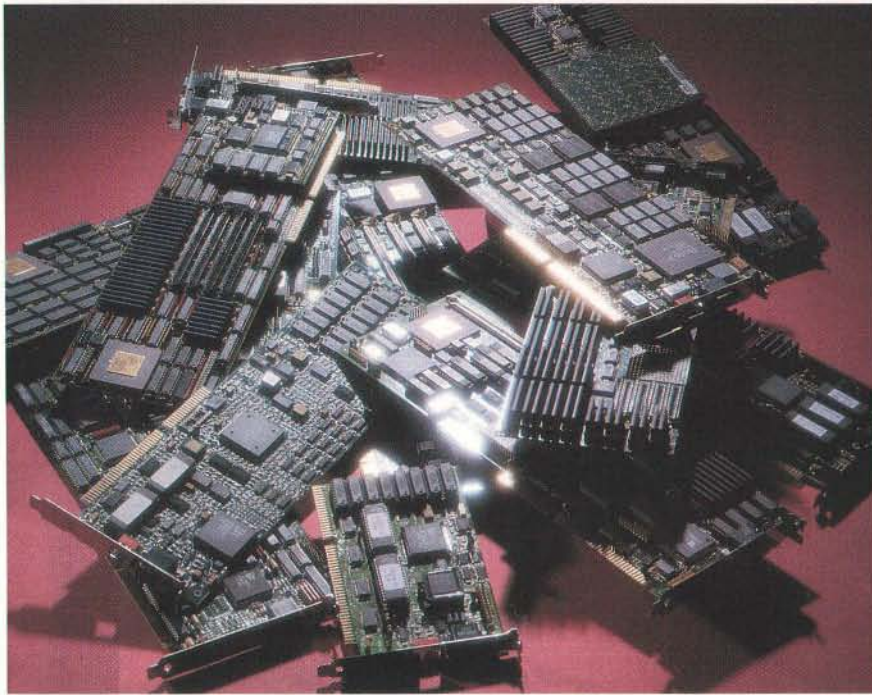
FastFaxes 106-005  
(Product Information via Fax)  
Call: 617-740-0025

To Order Call

**THE SHOP**  
PROGRAMMERS

1-800-421-8006

# 24-BIT DISPLAY ADAPTER ROUNDUP



## Twelve video adapters offer a true-color alternative for every budget

GREG LOVERIA

In the future, historians may tout the release of Windows 3.0 as the pivotal point for PC display technology. Microsoft programmers, showing great foresight, gave Windows 3.0 the capability of displaying images in full 24-bit (16.7-million-color) digital color. If you are still using an 8-bit (256-color) display adapter for Windows, this may not seem like an earth-shattering achievement. However, once you've used a 24-bit adapter, I think you'll never want to work in an 8-bit Windows display environment again.

Currently, applications like PhotoStyler, Image-In-Color, and Picture Publisher function like "digital darkrooms," enabling you to manipulate and edit 24-bit Targa, TIFF, and BMP image files using just an 8-bit VGA display. The major drawback is that 8-bit adapters must dither or color-band a 24-bit image to display it. Banding

and dithering are necessary because 8-bit adapters must compress a 24-bit image's 16.7 million colors into an 8-bit, 256-color palette to display it. For image editing and graphic art duties, banding and dithering can cause problems; what you see on your 8-bit display adapter may not be the actual colors you'll see when your edited 24-bit image files are transferred to slides or printed. (See the text box "What Is 24-bit Color?" on page 86.)

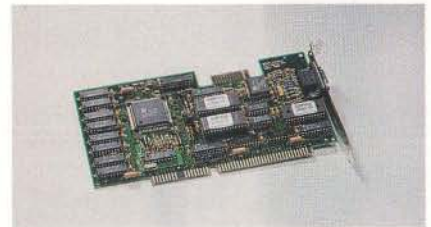
For this article, I looked at 12 24-bit display adapters. My goals were twofold: to observe the adapters subjectively, gauging ease of installation, and, of prime importance, to scrutinize 24-bit display quality under Windows 3.1. Performance speed was a secondary consideration; I used Texas Instruments' benchmarking utility, WinTach, to test each adapter's Windows throughput for objective comparisons. (See

the text box "Benchmarking the Benchmark: How Adapter Performance Speeds Were Evaluated" on page 89.)

I separated the 12 adapters into two key feature categories. Genoa Systems' Multimedia VGA 7900 and Diamond Computer Systems' SpeedStar 24X make up the first. These two boards offer inexpensive 24-bit color under Windows for under \$300 but support a maximum Windows resolution of only 640 by 480 pixels. The other 10 adapters make up the second category and support 24-bit true-color output in Windows at resolutions of at least 1024 by 768 pixels. Ranging in price from \$1295 to \$4495, these cards should appeal to Windows users with professional application display needs. The cards use various acceleration methods to enhance Windows' performance. (See the text box "TIGA vs. Fixed-Function Acceleration" on page 88.)

### Inexpensive 640-by-480-pixel Adapters

#### Multimedia VGA 7900



Genoa Systems' Multimedia VGA 7900 (\$199) is a 1-MB half-length adapter. Of the 12 units tested, the 7900 is the only one that is not accelerated; Genoa uses Tseng's ET4000 Super VGA chip set alone, but it complies with VESA's (Video Electronics Standards Association's) BIOS extensions. AT&T's 20C491-80 24-bit RAMDAC is also on board, and it supports 16.7-million-color display in Windows at resolutions of 640 by 480 pixels, 1024 by 768 pixels by 8 bits, and up to 1280 by 1024 pixels by 4 bits. Besides Windows 3.x, Genoa includes AutoCAD 10/11, AutoShade, and a number of word processing drivers.

The 7900 installed painlessly without my repositioning any IRQ (interrupt request) jumpers. Windows 3.x driver installation is equally easy. From two 5 1/4-inch floppy disks, you copy the drivers into the WINDOWS/SYSTEM subdirectory, and the Windows OEMSETUP.INF file is automatically modified. You then run Windows SETUP to select display resolutions.

Under Windows, at a resolution of 640 by 480 pixels by 24 bits, Image-In-Color



displayed beautifully clean, clear, and crisp 24-bit images. Genoa trademarks its non-interlaced technology as FlickerFree, and, indeed, all resolutions (even 1280 by 1024 pixels by 4 bits at 87 Hz) are absolutely rock steady. The 7900 is a fine bargain, especially with its extensive driver bundle. Although it's not an accelerated board, it performed well. I liked the 7900 and would recommend it as today's most inexpensive 24-bit Windows solution.

### SpeedStar 24X



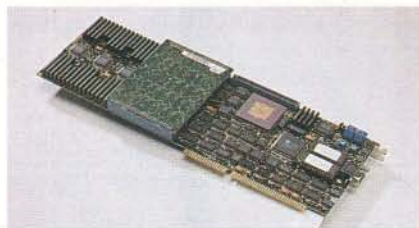
A 1-MB DRAM half-length card, the SpeedStar 24X (\$249) from Diamond Computer Systems implements Western Digital's WD90C31 graphics accelerator. As with Genoa's card, Diamond's 24-bit Windows drivers function at a maximum 640- by 480-pixel resolution. It also complies with VESA's BIOS extensions. Higher Windows resolutions include 1024 by 768 pixels by 256 colors in 72-Hz noninterlaced mode and 1280 by 1024 pixels by 16 colors in 43.57-Hz interlaced mode. Autodesk 3D Studio, AutoCAD, AutoShade, and several CAD, spreadsheet, and word processing drivers are also included.

The board installs easily, and resolutions are set using rear-mounted DIP switch configurations. Under Windows, at a resolution of 640 by 480 pixels by 4 bits, you select RUN from the FILE pull-down menu and type A:\INSTALL. You choose display resolutions from a driver menu on the 5 1/4-inch installation disk and then restart Windows. At 640 by 480 pixels by 24 bits, Windows is clear, crisp, and impeccably steady. Also, 24-bit TIFF and Targa images in PhotoStyler and Image-In-Color look wonderful and are equally crystalline at 1024 by 768 pixels by 4 bits and 1280 by 1024 pixels by 8 bits.

The SpeedStar 24X proved quicker in WinTach's overall RPM (relative performance measurement) results, although Genoa's VGA 7900 had faster CAD ratings (see table 1). Diamond also plans to be shipping its Stealth VRAM (video RAM) 24-bit card for \$399 by the time you read this. Diamond's SpeedStar 24X gets my nod of approval for best value-to-performance ratio in low-cost 24-bit 640- by 480-pixel Windows adapters (see table 2).

## High-Resolution 24-bit Adapters

### Truevision 1024-32



The Truevision 1024-32 full-length adapter implements TI's 32-MHz 34020 coprocessor. It supports 24-bit resolutions of 1024 by 768 pixels in 72-Hz noninterlaced mode and up to 87-Hz interlaced mode. Tseng's ET4000 VGA chip set is on-board, and the 1024-32 replaces your existing Super VGA adapter. Its standard \$2295 configuration ships with 1 MB of DRAM and 3 MB of VRAM. Daughter-board expansion modules of 4-MB DRAMs (\$1000) or 16-MB DRAMs are also available, although tests with and without the 4-MB module showed little difference in performance speeds. Drivers are included for Windows 3.x, AutoCAD 10/11/386, AutoShade, Autodesk 3D Studio, Lotus 1-2-3, and WordPerfect—along with a VBE (VESA BIOS extensions)-compliant TSR program.

Like Truevision's AT Vista adapters, the 1024-32 performs all operations in 32-bit true color: 24 bits of RGB and 8 bits of alpha data. In video applications, the extra 8 bits of alpha-channel data allows functions like chroma-keying (e.g., what you see when a meteorologist stands in front of weather-map video backgrounds). Currently, Windows supports only 24-bit image manipulation. However, according to Truevision, in Windows applications, the 8 extra bits of alpha data are used for caching functions. In DOS applications using the 1024-32 adapter, you can generate full 32-bit alpha-encoded images.

This is a well-engineered, complex, multifaceted adapter, and several configuration jumpers and rotary switches tailor the 1024-32 to system needs. Although configuration procedures can be intricate, Truevision's excellent documentation explains everything, often in graphic detail.

You install Windows drivers within Windows at a resolution of 640 by 480 pixels by 4 bits from a 5 1/4-inch floppy disk by selecting RUN from the FILE pull-down menu. You select resolution and monitor frequencies from a Truevision Settings icon and then restart Windows. In 60-Hz interlaced mode at a resolution of

1024 by 768 pixels by 32 bits, the display appears washed out, but at the same resolution in 72-Hz noninterlaced mode, the display is rock solid, clear, and crisp.

Using Truevision's \$995 RGB-to-NTSC VIDI/O converter box, you can record Windows or DOS applications directly to a VCR as composite video. I output and recorded 24-bit Windows sessions as NTSC interlaced video to my VCR in three resolutions: 756 by 486 pixels, 720 by 480 pixels, and 640 by 480 pixels. The 1024-32 and VIDI/O combination enabled me to render and then record 24- and 32-bit images directly to videotape.

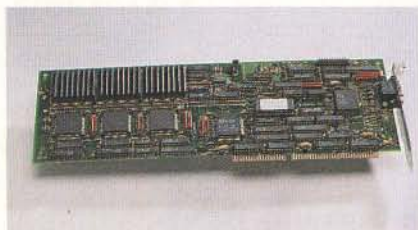
I hold the Truevision 1024-32 in high esteem. By adding a single-frame insert-editing videotape recorder and controller board, animators could generate 32-bit video animations on a single VGA monitor. If your needs dictate using 24-bit Windows imaging applications as well as 32-bit rendering functions, consider building your PC imaging system around this adapter.

*continued*

## BYTE ACTION SUMMARY

- **WHAT 24-BIT COLOR BOARDS DO**  
For image editing and professional graphics applications in Windows, they let you display and accurately edit 24-bit Targa, TIFF, and BMP image files using a color palette of 16.7 million colors.
- **LIKES**  
Besides eliminating dithering and banding problems, the majority of adapters implement acceleration chips that also speed Windows applications and productivity.
- **DISLIKES**  
Difficult TIGA installations and poor documentation.
- **RECOMMENDATIONS**  
Although it posted median-to-swift speeds, Number Nine Computer's #9GXITC rates high for its easy hardware and software installation, excellent virtual screen utilities, and price. For inexpensive 24-bit Windows display at a resolution of 640 by 480 pixels, Diamond Computer Systems' SpeedStar 24X is a winner.

## MultiView 24



Known for its 24-bit Macintosh products, Radius also offers the MultiView 24 adapter (\$1999), a full-length board that's based on three 8514 chips and comes with 3 MB of

VRAM. The 8514s are used as "drawing accelerator gate arrays," not coprocessors. Radius explains that using three 8514 chips on-board—one for each digital red, green, and blue signal—yields faster speeds by providing a 96-bit display data path. Brooktree's 473 24-bit RAMDAC supports Windows resolutions of from 640 by 480 pixels to 1024 by 768 pixels. The MultiView 24 uses VGA pass-through and includes cabling to connect your Super VGA adapter's feature-bus connection to the MultiView 24's feature bus. Only Windows 3.x drivers ship with the card (Super VGA card driver and chip-set functions are passed through

the adapter for DOS applications).

Radius's three-page quick-start manual makes hardware and driver installation a breeze. It swiftly details pass-through cabling, board-address selection, and monitor settings. From a 5/4-inch driver floppy disk, under Windows at a resolution of 640 by 480 pixels by 4 bits, you choose RUN from the FILE pull-down menu, type A:\INSTALL to select the 1024- by 768-pixel by 24-bit driver, and then reboot Windows.

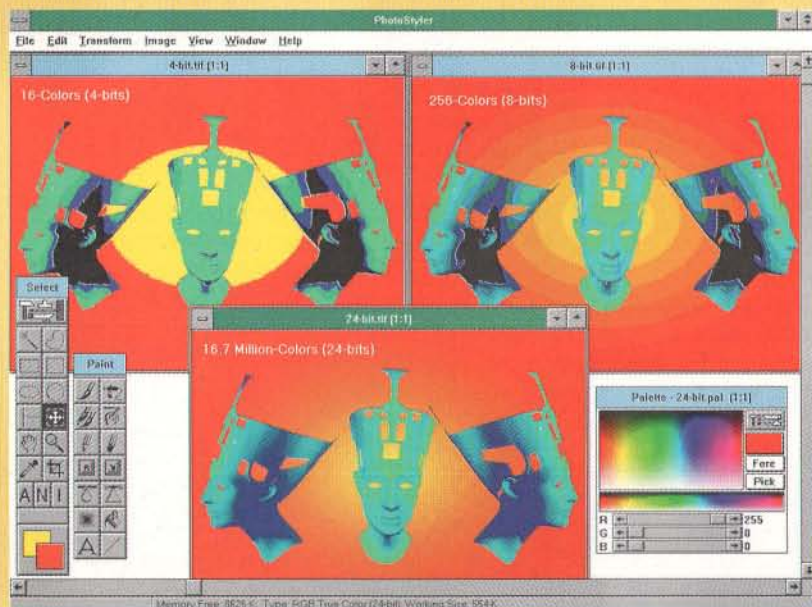
At 1024 by 768 pixels by 24 bits, the Windows display is razor sharp, brilliant, and steady. PhotoStyler 24-bit images look excellent. Although the WinTach ratings were a little slow, there were noticeable performance boosts to pull-down and pop-up menus. Overall, I personally liked this adapter because of its screen clarity and genuinely easy and fast installation. It's a well-thought-out Windows imaging product and merits high marks.

## WHAT IS 24-BIT COLOR?

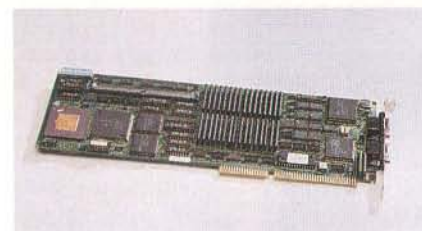
**O**n 8-bit display adapters, each screen pixel can display one color out of a maximum color palette of just 256 colors. The 24-bit display adapters have a palette of 16.7 million colors; that is, each individual screen pixel can display one color chosen from a palette of 16.7 million. Windows has a default VGA screen resolution and bit-plane pixel color depth of 640 horizontal pixels by 480 vertical lines, using 4 bits per pixel (just 16 colors allowed). Although screen resolution is an important factor affecting image quality, it is actually less important than color bit depth. The more colors you can display simultaneously, the easier it is to fool the hu-

man eye into perceiving a higher-quality image.

The 1024- by 768-pixel Windows screen shown in this text box was captured using Aldus's PhotoStyler with a 24-bit true-color display adapter. The top-left window shows the 24-bit image as it would look on a standard 4-bit (16-color) 256-KB VGA display adapter; the top-right window shows how the image would look on an 8-bit (256-color) 1-MB Super VGA adapter; the bottom image is displayed in full 24-bit digital color. Notice the image banding and dithering that occur in both the 4- and 8-bit images. (File-to-slide conversion courtesy of Image Center, Roanoke, VA.)



## Volante AT2004



National Design, Inc.'s, Volante AT2004 adapter (\$1995) is a full-length card based on TI's 40-MHz 34020 coprocessor. The test unit arrived with 4 MB of VRAM on-board. Other 2000-series adapters, like NDI's AT2084 (\$3195), can be expanded to 8-MB DRAM/4-MB VRAM to further boost 24-bit Windows performance. TI's TLC-34076 24-bit RAMDAC and proprietary NDI acceleration ASICs (application-specific ICs) also speed throughput. The card's 24-bit noninterlaced Windows resolutions range from 640 by 480 pixels to 1024 by 768 pixels. The board also supports a resolution of 1280 by 1024 pixels in 16 or 256 colors.

The Volante AT2004 replaces your existing VGA or Super VGA adapter and uses Acumos's VGA chip set. The card is VBE BIOS-compliant and, like Truevision's adapter, is a 32-bit board using the extra 8 bits of alpha data for caching. Vibrant Graphics' DL-Xpress drivers for AutoCAD, AutoShade, and Autodesk 3D Studio ship with the Volante AT2004. Soft Engine/386 AutoCAD drivers are also available for an additional \$200.

NDI's TIGA (Texas Instruments Graphics Architecture) installation is straightforward. A menu-driven installation program copies all TIGA communication files

## WINTACH BENCHMARK TEST RESULTS

**Table 1:** The adapters were tested using a Zeos 486/25 EISA system with 8 MB of RAM. For gauging display quality, Optique's 14-inch 3000 monitor was used—it has a Sony .24-mm-dot-pitch Trinitron CRT. Nanao's Flexscan 9500, a 20-inch multifrequency monitor, was used to test 24-bit resolutions greater than 1024 by 768 pixels. For image input, Microtek's MRS-600Z 24-bit color scanner was used with Windows 3.1 and two 24-bit image-editing programs, PhotoStyler and Image-In-Color. Pointing devices used were Wacom's 420 cordless digitizer tablet and a Microsoft Mouse. In VGA pass-through modes, an unaccelerated 1-MB Diamond SpeedStar Super VGA adapter was coupled with the unit being tested.

Adapter	Word Processing	CAD/ Drawing	Spreadsheet	Paint	Overall RPM
<b>GROUP 1 (640 by 480, 24 bits)</b>					
Multimedia VGA 7900	5.94	13.08	4.26	7.68	7.74
SpeedStar 24X	6.54	11.58	9.48	6.96	8.64
<b>GROUP 2 (1024 by 768, 24 bits)</b>					
MultiView 24	26.41	21.65	17.66	12.74	19.62
Impression-S	18.12	26.57	19.50	35.17	24.84
Impression-1024	12.44	24.26	12.13	15.05	15.97
<b>GROUP 3 (1024 by 768, 32 bits)</b>					
Hercules Chrome Model C638	66.56	115.91	39.32	66.35	72.04
#9GXITC	22.93	125.95	31.33	28.26	51.66
Volante AT2004	20.07	119.80	30.51	52.42	55.70
MonaLisa	22.11	108.74	24.98	43.92	49.91
Truevision 1024-32 (w/ 4MB)	37.47	25.60	18.43	14.54	24.01
Rapier 24	36.86	156.05	48.74	87.44	82.27
<b>GROUP 4 (1280 by 1024, 24 bits)</b>					
Impression-Ultra	42.24	50.94	43.26	41.21	44.41

Higher numbers = better performance for all tests. See the text box "Benchmarking the Benchmark: How Adapter Performance Speeds Were Evaluated" on page 89 for a full description of the WinTach performance rating indexes.

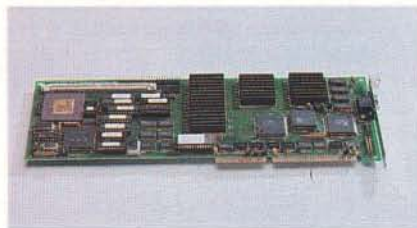
to your hard drive from one 5¼-inch floppy disk and then guides you through monitor, resolution, and board-address selection. There is one main DIP switch on-board to resolve IRQ/address conflicts.

I used default settings defined in NDI's sparse but accurate manual but found a conflict with my Mylex motherboard BIOSes that caused VRAM test failures. After some experimentation, I repositioned the board at address 0x0D400 via the diagnostic menu and then rebooted. With VRAM working and the TIGA link successfully established, I used Windows SETUP to choose Windows resolutions.

Under Windows at a resolution of 1024 by 768 pixels by 24 bits, the display is stable but a tad fuzzy compared to the Radius adapter, but I would still consider it sharp on its own merits. Also, 24-bit Targa image colors were absolutely brilliant in my PhotoStyler comparisons.

I was pleased that WinTach's RPM results confirmed my hunch: This board is fast. Inside every Windows application, you actually can feel performance boosts. NDI also warrants its adapters for life—a rarity for computer components. If you require swift 24-bit Windows speeds and use AutoCAD often, you may find the board to be an excellent value.

### MonaLisa



Opta's full-length MonaLisa (\$1995), a 4-MB VRAM adapter, has SIMM slots for adding 1 or 4 MB of on-board DRAM. The MonaLisa implements TI's 32-MHz 34020 coprocessor along with Brooktree's 473 24-bit RAMDAC. With Tseng's ET4000 Super VGA chip set on-board, it replaces your existing Super VGA adapter. Windows resolutions range from 640 by 480 pixels to 1024 by 768 pixels in either 8- or 24-bit color depths in 72-Hz noninterlaced modes.

The company ships only Windows 3.x drivers with the unit. After you purchase the board, you can also receive Vibrant's AutoCAD and Autodesk 3D Studio ADI drivers free of charge by calling Opta directly.

I found the installation of the TIGA link software somewhat complicated. From a

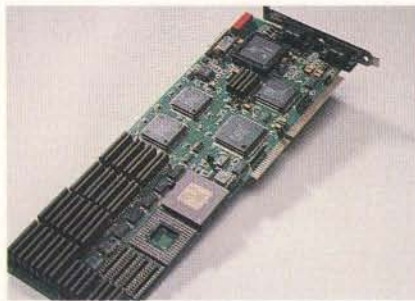
5¼-inch floppy disk, the installation menu prompts you for the board's eight-digit serial number. I missed this instruction in Opta's documentation, which is technically excellent but looks unprofessional. I had to quit the installation procedure and remove the board to find its serial number. After you enter the serial number, the installation program prompts you for monitor and board-address settings; then, you reboot the system to establish the TIGA link. Next, using TIGAMODE, you set board resolutions. Windows SETUP selects Windows display resolutions.

Under Windows at a resolution of 1024 by 768 pixels by 24 bits, the display is somewhat fuzzier than with the Volante AT2004. But like the Volante, the MonaLisa redeemed itself by displaying steady, vibrant 24-bit colors using Image-In-Color. In CorelDraw 3.0, where line-art drawing functions predominate, the lack of sharpness was more noticeable; but again, colors were brilliant.

The MonaLisa posted good speeds in the WinTach tests—overall, slightly slower than that of the Volante—and edged it out in the word processing comparisons. Installation and sharpness problems aside, the MonaLisa is well made and proved a fair value, especially at the speeds noted.

*continued*

## #9GXiTC



Number Nine Computer's full-length #9GXiTC adapter (\$2295) implements a 40-MHz 34020 coprocessor and ships with 4 MB of VRAM. Acumos's VGA chip set is on-board, and the #9GXiTC can replace your existing Super VGA card or you can configure it for use as a two-monitor system using VGA pass-through for CAD applications. The card is VBE BIOS-compliant and uses TI's 34076 24-bit RAMDAC. Three proprietary ASICs help speed Windows functions. Besides Windows 3.x, additional drivers support all Autodesk products and more than 15 other CAD and rendering applications.

Number Nine's menu-driven installation software makes TIGA's complex configuration a breeze, taking all of 2 minutes to install from one 5 1/4-inch floppy disk. Windows 3.1 installation is equally slick and painless. After rebooting to establish the TIGA communications link, you start Windows in 16-color 640- by 480-pixel mode; then, from the FILE pull-down menu, you RUN A\GXiSETUP.EXE from a second 5 1/4-inch floppy disk. Driv-

er files are copied to your hard drive, simultaneously modifying Windows .INI files. A Number Nine Hawkeye Feature Set program group opens, containing three icons—Zoom, Resolution Exchange, and Chameleon Cursor. Using Resolution Exchange, you select a Windows display resolution and color bitdepth and then restart Windows.

The adapter supports noninterlaced 24-bit Windows resolutions of up to 1024 by 768 pixels, and the display is spectacularly clear, vibrant, and crystalline at all resolutions. Like many of the other boards I tested, the #9GXiTC is a 32-bit color adapter, using the extra 8 bits of alpha for caching. The board also supports 65,536 colors (16 bits plus) at resolutions of from 1280 by 1024 pixels to 1280 by 1600 pixels to 2048 by 1024 pixels using Number Nine's Virtual Screen functions.

Virtual Screen is an amazing productivity enhancement feature, effectively providing an immense Windows desktop workspace. For instance, in a gigantic Microsoft Excel spreadsheet or tabloid-size PageMaker layout, simply dragging the mouse to the left or right smoothly autopans Windows screen data on- or off-screen.

In my PhotoStyler tests using HawkEye Zoom, by pressing F11 I was able to instantly zoom a scanned image in landscape mode to four times its size to perform minute touch-up work. The Chameleon Cursor icon substitutes cursor colors on the fly. If you've ever lost sight of the Windows white or gray cursor while performing image edits, this feature is great.

In 4- and 8-bit modes (16 and 256 col-

ors, respectively), you can even achieve virtual screen resolutions of 2048 by 2048 pixels on a 14-inch monitor. Because Windows imaging applications manipulate image data at 24-bit color depths "behind the scenes," I found the 2048- by 2048-pixel 8-bit virtual mode fabulous for touch-up work in very large images. (After my 8-bit edits using this feature, I rechecked the images in a 24-bit display mode.) By the time you read this, Number Nine will be including a mouse motion-virtual-zoom function as well.

In the WinTach tests, the #9GXiTC posted median-to-swift speeds. Although it's just slightly slower than the Volante, this card moves right along. In the CAD results, it even outpaced the Volante. Everything about this board is thoroughly impressive. Its easy installation and excellent documentation are great. Its screen clarity, sharpness, vivid colors, and Virtual Screen utilities are superb. Because of these utilities, crystal-clear display, and extensive DOS application drivers, I rate the #9GXiTC adapter highly.

## Impression-1024



Matrox Electronic Systems' Impression-1024 (\$1295) sports 3 MB of VRAM and uses S3's 86C911 fixed-function accelerator chip. The full-length adapter supports noninterlaced 24-bit resolutions up to 1024 by 768 pixels using Brooktree's BT484 24-bit RAMDAC and is VBE BIOS-compliant. The board replaces your existing Super VGA adapter. By the time you read this, Matrox will be shipping a hardware pan and zoom utility that will provide zoom resolutions of from two to four times that of the original with just the click of a mouse button. It's bundled with Windows 3.x and over 20 DOS applications drivers, such as WordPerfect, Microsoft Word, and Lotus 1-2-3.

Board installation is a snap; no jumpers or DIP switches need to be configured. Likewise, Windows display resolution reconfiguration is easy. You use Windows SETUP to copy files from three driver floppy disks. Under Windows at a resolution of 1024 by 768 pixels by 24 bits, the cursor is slightly blurry. However, the screen is beautifully stable, pinpoint sharp, and clear. The adapter posted

## TIGA VS. FIXED-FUNCTION ACCELERATION

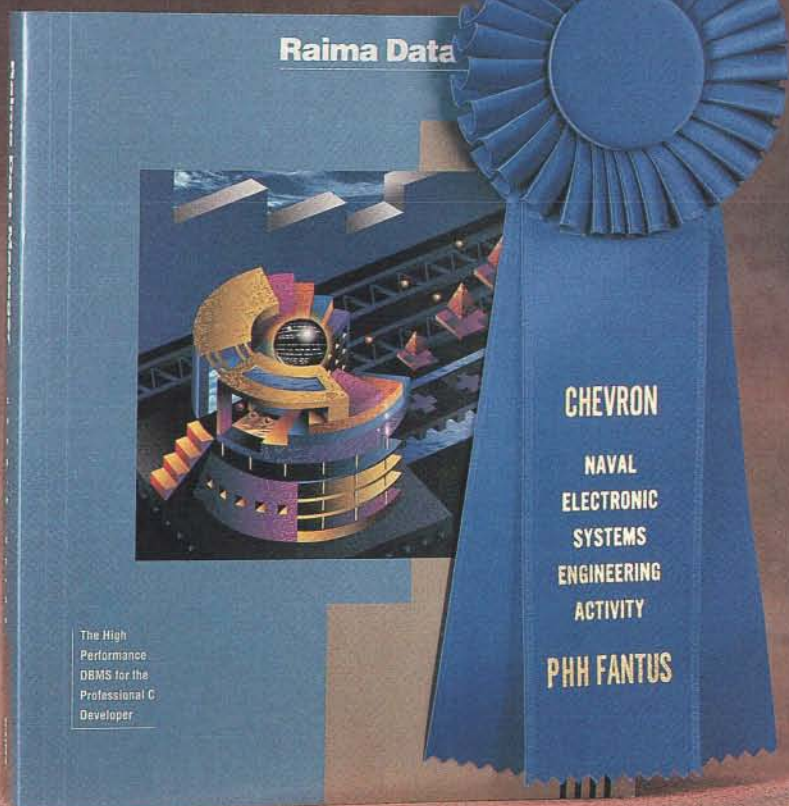
All the cards reviewed, except Genoa's Multimedia VGA 7900 adapter, incorporate a graphics acceleration chip to help speed Windows throughput. Coprocessed adapters implement TIGA (Texas Instruments Graphics Architecture) 340x0 graphics processors.

Fixed-function cards implement chips such as S3's 86C911 and Western Digital's WD90C31. TIGA coprocessors use a software-to-hardware communications link established at system boot-up. TIGA drivers can be upgraded by the manufacturer. You simply upload

any improvement updates to the coprocessed card.

Fixed-function acceleration chips have their graphics algorithms hard-coded in discrete logic. For both types of cards, an adapter manufacturer's software drivers determine which graphics functions—like BitBlts, font caches, and memory-to-screen writes—will be intercepted en route to the system's CPU and off-loaded to the graphics acceleration chip for processing. Off-loading these graphics duties accelerates Windows performance speeds and throughput.

# Since when is Raima first in Corporate Database Development?



## Since April 7, 1992

Raima Database Manager was the database of choice in the First Annual Windows World Open. The competition featured innovative custom applications built with Windows development tools. Three of the seven winners, and two of the finalists, used Raima Database Manager to solve their critical application needs.

For professional developers like yourself, Raima products offer:

- **High performance:** unmatched application speed.
- **Portability:** runs on DOS, Windows, OS/2, UNIX, VMS, QNX.
- **Royalty-free distribution:** increase your profits.
- **Source-code availability:** total programming flexibility.
- **Affordable pricing:** starting at just \$395.
- **Language support:** ANSI C, C++, and Visual Basic.

Listen to what some of our customers say about our products:

*"No other products matched Raima for the price."*

James Lisiak, developer, Chevron

*"Raima provided us with speed, flexibility, and royalty-free distribution which allowed us to meet and exceed our customers' needs."*

Dave Cooper, developer, Atlantic Research Corp,  
(subcontractor, Naval Electronic Systems Engineering Activity)

*"Database Manager gave us the edge we needed to handle large amounts of data quickly and efficiently within Microsoft Windows..."*

Kelly Patrick, developer, PHH Fantus

If you're looking for an award-winning application development tool, give us a call. And discover the Raima advantage.

**Raima Database Manager** *The high-performance DBMS*  
**Raima Object Manager** *The object storage class library*

Raima Corporation • 1605 NW Sammamish Rd. • Suite 200 • Issaquah, WA 98027 • (206)557-0200 • Fax (206)557-5200

**1-800-DB-RAIMA** Also available for  
DOS, OS/2, and UNIX

Copyright © 1992 Raima Corporation. All rights reserved.

Circle 117 on Inquiry Card.

## 24-BIT DISPLAY ADAPTER FEATURE COMPARISON

**Table 2:** If you can live with standard 640- by 480-pixel resolution, the SpeedStar 24X and Multimedia VGA 7900 offer 24-bit color at budget prices.

Adapter name	Accelerator chip	VGA chip set	VRAM (MB)	DRAM (MB)	VBE BIOS	Maximum 24-bit resolution	24-bit RAMDAC	Retail price
Multimedia VGA 7900	N/A	ET4000	0	1	BIOS	640 × 480	ATT20C491	\$199
SpeedStar 24X	WD90C31	WD90C31	0	1	BIOS	640 × 480	Diamond SS2410	\$249
Truevision 1024-32	34020/32	ET4000	3	1	TSR	1024 × 768	Brooktree 473	\$2295
MultiView 24	8514	N/A	3	0	N/A	1024 × 768	Brooktree 473	\$1999
Volante AT2004	34020/40	Acumos	4	0	BIOS	1024 × 768	TI34076	\$1995
MonaLisa	34020/32	ET4000	4	0	BIOS	1024 × 768	Brooktree 473	\$1995
#9GXITC	34020/40	Acumos	4	0	BIOS	1024 × 768	TI340767	\$2295
Impression-1024	86C911	S3/VGA	0	3	BIOS	1024 × 768	Brooktree 486	\$1295
Impression-S	34020/20	N/A	3	1	N/A	1152 × 882	Brooktree 463	\$1995
Impression-Ultra	XG386	N/A	7	1	N/A	1600 × 1200*	Brooktree 463	\$4495
Hercules Chrome C638	34020/40	N/A	3	8	N/A	1152 × 882	Brooktree 473	\$2595
Rapier 24	34020/32	N/A	3.5	1	N/A	1152 × 882	Brooktree 463	\$2995

\* Only 1280- by 1024-pixel, 24-bit resolution was tested; see text.  
N/A = not applicable; uses VGA pass-through.

slow WinTach results, but there was a noticeable increase in overall Windows speed compared to my 8-bit nonaccelerated SpeedStar.

The Impression-1024's Windows display output was one of the sharpest and clearest I observed. According to Matrox, there should be a sizable price reduction on the Impression-1024 and other Matrox boards by the time you read this. Slower speeds aside, I give the 1024 high marks for its super-low price and excellent Windows display output.

### Impression-S



Based on the 32-MHz 34020 coprocessor, Matrox's full-length Impression-S adapter (\$1995) uses VGA pass-through and comes with 3 MB of VRAM, 1 MB of DRAM, and Brooktree's 463 24-bit RAMDAC. It supports 24-bit Windows resolutions of from 1024 by 768 pixels to 1152 by 882 pixels noninterlaced. The Impression-S is a reengineered release of Matrox's first Impression adapter that uses extensive gate-array ASICs that, according to Matrox, provide a 30 percent increase in speed over its earlier Impression adapter.

For hardware installation, the configuration software programs the card's BIOS

and locates the adapter in system memory. You must first remove Windows' HIMEM.SYS or any XMS (Extended Memory Specification) memory management

software from CONFIG.SYS and reboot. Windows resolutions are then chosen via the configuration program; I positioned the adapter at address D8000-DBFFF for

## BENCHMARKING THE BENCHMARK:

### HOW ADAPTER PERFORMANCE SPEEDS WERE EVALUATED

I used Texas Instruments' WinTach 1.1, a Windows throughput rating utility, to gauge adapter performance speeds. WinTach emulates CAD, word processing, spreadsheet, and paint application functions in a Windows 3.1 environment. To "benchmark the benchmark" and verify WinTach's results, I used another benchmark utility, Winspeed, to test known speed differences between two adapters. Speed variances reported between the two adapters using both benchmark utilities proved identical in my percentile calculations.

WinTach does not perform chip-specific calls; it measures Windows 3.1 performance speeds of the emulated applications through calls made to Windows 3.1's API. The API speed results are evaluated and displayed in an RPM (relative performance measurement) index. The RPM index number rates how many times faster an adapter performed WinTach's emulated application functions compared to a 20-MHz

386DX system equipped with a standard 8-bit VGA adapter. When I spoke with TI representatives, they stressed that WinTach results should be compared among adapters only if the tests are performed at identical resolutions and color bit depths. The WinTach test data results in table 1 are grouped this way. Also, higher resolutions and/or bit depths mean more graphics data is being processed through the adapter and Windows API. Test results should not be compared between adapters in different groupings.

Some adapters implement 32-bit color depths in Windows and have been grouped accordingly. As explained in the main text, Windows 3.1 can display and manipulate only 24 bits of color information. The extra 8 bits of alpha data is often used for data caching, although the extra bits are not always used this way; this varies among manufacturers and driver implementation. WinTach 1.1 can be downloaded from BIX in the windows.utilities listings.

# Hercules

# CHROME

24-Bit  
Windows  
Accelerator

# LOSE WAIT!

And look great with Hercules CHROME™

**Fastest** – 24-bit graphics at 8-bit speed

**No Compromise** – 16.7 million colors at up to 1152 x 900 resolution

**Dual Page** – readable type on a two page spread

**Highest Refresh** – up to 90Hz for a comfortable workout

**True color graphics** – all gain, no pain!

Whether your personal goal is more speed, more power, more flexibility or a whole new look... **pick up CHROME!**

Call today for breakthrough pricing.

# 800-532-0600



© Copyright 1992 Hercules Computer Technology, Inc. 3839 Spinnaker Court, Fremont, CA 94538. Hercules is a registered trademark and CHROME is a trademark of Hercules Computer Technology, Inc. The Autodesk logo is registered in the U.S. Patent and Trademark Office by Autodesk, Inc. The Microsoft Windows Logo is a trademark of Microsoft Corporation. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corporation.

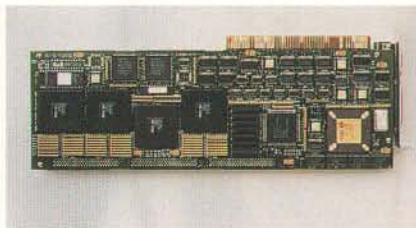
Circle 92 on Inquiry Card.

1024- by 768-pixel resolution tests. From the installation disk, Windows drivers are next copied into the WINDOWS\SYS-TEM subdirectory. Manually, you reinvoke HIMEM.SYS in CONFIG.SYS and reboot the system.

As with the Impression-1024 adapter, the screen under Windows at all resolutions from the Impression-S is very clear and crisp, although the 24-bit 1152- by 882-pixel mode showed a slight moiré pattern. In both resolutions, the cursor was sharp, and both resolutions posted identical WinTach results. However, as pointed out in the text box "Benchmarking the Benchmark," higher Windows resolutions mean that there is more pixel data that must be manipulated. I was pleased to see that the higher 24-bit 1152- by 882-pixel resolution caused no degradation in board performance times.

For the price and the speeds posted, you might want to consider an alternative adapter. However, having used the first release of the Impression adapter for almost two years in a 24-bit Windows imaging environment, I must mention that I've experienced no problems with the unit and have found Matrox's support excellent. If vendor and board stability is a concern, then the Impression-S may just be the adapter you've been looking for.

### Impression-Ultra



At \$4495, Matrox's Impression-Ultra adapter was the most expensive 24-bit Windows display board I reviewed, but it should appeal to Windows users who work in high-end color prepress or photographic applications. This full-length adapter is a mother-daughter two-board combination; the first slot requires an EISA bus, and the second slot requires an ISA bus. The Ultra ships with 7 MB of VRAM and 1 MB of DRAM on-board, using Brooktree's 463 RAMDAC and proprietary Matrox XG386 ASICs for 24-bit color. According to Matrox, this combination provides 3 MB of data transfer per screen refresh using a 192-bit graphics data path. The board supports 24-bit Windows resolutions of from 1280 by 1024 pixels to 1600 by 1200 pixels. The board uses an external DB-15 port-to-port cable for VGA pass-through functions.

Board installation is comparatively easy for an EISA adapter; I copied the EISA configuration files to my hard drive from the installation floppy disk and then let my Zeos-Mylex EISA configuration software "auto-add" the adapter into my system set-up. After rebooting, hardware-to-software links are established that upload communications code to the board's BIOSes. Af-

**T**he Consistent Color manual is one of the best 24-bit documents I've seen.

ter communications link and monitor tests, your AUTOEXEC.BAT file is modified to automatically establish the link at boot-up. This sounds difficult, but it is quite easy and explained thoroughly in the documentation. You choose Windows resolutions from DOS by typing IMPUDL 1200 or 1600, which uploads Windows display settings to the adapter BIOS.

Under Windows at a resolution of 1280 by 1024 pixels by 24 bits, the Ultra's display is sheer precision, crystal clear, and solidly stable. Windows functions glide smoothly and quickly, and the board supports real-time pan and zoom functions.

Unfortunately, I was unable to test the Ultra's higher 1600- by 1200-pixel resolution because of system configuration problems. Nanao confirmed that this resolution should function on its monitor, but the display vibrated and pulsed rapidly. After speaking with Matrox support and discussing several possible solutions, I was still unable to resolve the problem in time for inclusion in the review. However, using a computer system provided by Matrox, the company demonstrated to BYTE editors that the 1600- by 1200-pixel resolution works. Gauging just from the Ultra's superb 24-bit performance at 1280 by 1024 pixels, if you are an imaging professional who requires precision in the Windows environment, I'd rate this board high, even though it is expensive.

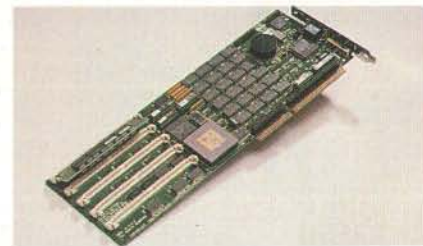
All Matrox true-color adapters ship with two impressive and professional Windows utilities. Consistent Color is a precision monitor-calibration program that fine-tunes color display output to any lighting envi-

ronment using white balance, monitor, and white gamma color-correction algorithms. You can tune a monitor manually or use an external densitometer—Sequel Imaging's \$1445 Four Channel System Calibrator (Sequel Imaging, 1 Palmer Dr., Londonderry, NH 03053, (603) 425-2170)—that connects from a communications port to the monitor's glass CRT screen. You then adjust and balance analog and digital color temperatures and workspace gamma using the densitometer readings or without it, visually. The Consistent Color manual is one of the best documents I've seen on 24-bit digital color.

Matrox's WinSqueeze JPEG compression utility let me compress a 339,318-byte 24-bit BMP file to 31,882 bytes using a WinSqueeze Q-Factor of 50 percent. Although JPEG is not lossless and induces image artifacts (e.g., reduction noise), the reduced image looked as good as the non-compressed BMP image. This utility is great for saving thumbnail representations of work in progress, but I would recommend against using it on master images.

Matrox boards are well made, and their support is excellent. Judging from them and the WinSqueeze and Consistent Color products, it's obvious that Matrox knows professional 24-bit color. Depending on your needs and budget, these boards should definitely be considered.

### Hercules Chrome Model C638



The Hercules Chrome series of 24-bit adapters from Hercules Computer Technology are full-length 3420-based boards with 3 MB of VRAM and 1 MB of DRAM. They come in three basic configurations: a 32-MHz Model C531 (\$1695), a 40-MHz Model C631 (\$1895), and a 40-MHz Model C731 (\$1995) that provides higher vertical refresh bandwidths to enhance display stability. My 40-MHz C638 test unit (\$2595) arrived with an extra 8 MB of DRAM on-board. Hercules assured me that there were no speed differences in the performance times I observed using the 8-MB C638 and the 1-MB C631 unit.

Designed with an eye toward professional color prepress applications, the Chrome adapter can address up to 40 MB of on-board DRAM. According to Hercules,



# A monitor touched by Michelangelo

Buy an IOcomm ThinkSync 7A 17" color monitor with a Michelangelo VRAM 1280 Graphics Accelerator and you've got a graphics subsystem that delivers unmatched performance for large screen, high resolution users (up to 1280 x 1024 non-interlaced resolution). All for the unbeatable price of **\$1295\***.

## Ideal for CAD, Desktop Publishing, Windows.

Michelangelo's 1280 x 1024 non-interlaced resolution coupled with the monitor's .26 dot pitch gives CAD users crisp, stable definition, even on hairlines

Graphic designers and desktop publishers appreciate the larger, distortion-free flat image area that allows edge-to-edge graphics, and redraws them with lightning speed. Windows users go for the rock-solid, flicker-free image made possible by refresh rates up to 72Hz, and *all that color*—32,768 colors in low-resolution; 256 in high resolution modes.

No wonder *Infoworld* said IOcomm's color fidelity was "the best in this product comparison."



## More sizes, too.

17" too small? For a few dollars more, you can get Michelangelo with the new ThinkSync II 20" Trinitron screen. But if you need something slightly smaller, we'll send you information on the whole ThinkSync line, including our 14" and 15" monitors.

For order support or the nearest dealer, call us today at **(310) 644-6100** or **1-(800) 998-8919**.



With IOcomm, the cost of high performance is within your reach.



12700 Yukon Avenue  
Hawthorne, CA 90250  
(310) 644-6100 Fax (310) 644-6068  
1-(800) 998-8919

\*Limited time only (MSRP \$1545)

© Copyright 1992, IOcomm. Specifications may change without notice. All brands and names mentioned are registered trade marks of their owners.

Circle 97 on Inquiry Card (RESELLERS: 98).

# Have You Ever Wanted To Leap Out The Nearest Window?

## Take The Plunge With Proxy. It's Network Remote Control For Windows, From Windows.

Some things you expect in remote control software. Like lightning-fast speed. And control over both DOS and Windows on the host PC. But new Proxy gives you something you probably don't expect. Because it not only works with Windows, it works from Windows. And that makes all the difference.

You see, other remote control products run from DOS, even



If it runs on the host, it runs in a Proxy window. Even graphical DOS programs.



Proxy supports host computers running Windows.

No need to abandon your own work when someone calls. Just click on a Proxy icon and instantly connect to the caller's machine. You now have full control of their hardware and software, complete with mouse and keyboard support, whether they're running Windows or DOS.

## Reconfiguring Lots of Workstations? Leap Out The Nearest Window.

Now you can perform administrative chores like software installation, updates, and system configuration without going from room to room. Just capture a PC and perform any operation as if you were sitting in front of it. You can even reboot it remotely!



Proxy gives you complete control of any computer on the network.

## Need More Processing Power? Leap Out The Nearest Window.

Imagine off-loading your most CPU-intensive tasks to separate machines you control as if they were part of your own desktop. Imagine two, three, or more applications, each running at full speed because each has its own dedicated processor. That's the power of multi-processing with Proxy.

You can make Proxy available across the network and give power-hungry users access to spare or idle PCs. You can even dedicate PCs to specific tasks, like a high-powered 486 for CAD or a modem-equipped 286 for communications.

## Take The Next Logical Leap in Remote Control.

Get the most advanced network remote control available, with applications ranging from user support to multi-processing. Get Proxy. It's from Funk Software. The same people who brought you Sideways,® Allways, and other top-selling PC utilities.

Call today to order or for more information.

1-800-828-4146 Ext. 813 (U.S. and Canada)



You can connect to multiple PCs over a network, with each appearing in its own window.

those that support a host running Windows. So they allow just one connection at a time, and demand total attention from your computer. But Proxy is a Windows application that lets you make multiple connections simultaneously. You can display and control a different host PC in each window you open, while you continue to run local applications.

## Users Calling For Help? Leap Out The Nearest Window.

If your job is to help users on the network, Proxy will make it easier.



Run time-consuming jobs on dedicated processors, and control them all from Proxy.

**FUNK  
SOFTWARE**

# PROXY™

System Requirements: Proxy "Master" runs in Windows and can control multiple "Hosts" running DOS or Windows over an IPX network (e.g. NetWare).

© 1992 Funk Software, Inc. Proxy is a trademark of Funk Software, Inc.

Funk Software, 222 Third Street, Cambridge, MA 02142 Tel (617) 497-6339 Fax (617) 547-1031

Circle 149 on Inquiry Card (RESELLERS: 150).

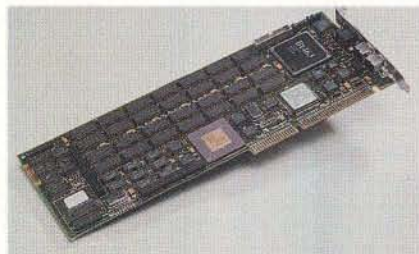
this lets you manipulate large bit-map images directly using on-board DRAM as opposed to passing graphics data to system memory or paging it to your hard drive using virtual memory.

Further experimentation and research showed that, currently, Windows 3.1 cannot address the Chrome's extra on-board DRAM, and it is left to the imaging application in use to circumvent this problem; some DOS-oriented imaging software, like PixaArts' PixaFoto, addresses on-board DRAM directly. Many manufacturers and software developers are looking to Windows NT to rectify this obstacle.

The Chrome C638 supports a number of 24-bit Windows and 32-bit DOS resolutions: 1024 by 768, 1120 by 768, 1120 by 832, 1152 by 864, 1152 by 870, 1152 by 882, 1152 by 900, and 640 by 480 pixels. Drivers for all Autodesk products and a host of DOS applications ship with the unit. Board installation is a breeze; there are no jumpers or DIP switches to set, as the board's system address is set through software. After establishing the TIGA communications link, you choose board resolutions using Hercules' MoniTrac utility. Next, you copy Windows display drivers into the WINDOWS\SYSTEM subdirectory using SETUP.

At all resolutions, the Chrome's display is very sharp, stable, and clear. WinTach's results confirmed my suspicions: This adapter makes Windows' 24-bit environment hustle, and you can feel the results—in PhotoStyler, pans and zooms were almost in real time. It outpaced almost every board by a considerable margin in the overall RPM rating, although it did place lower in some CAD functions. At its \$1895 base price, the Hercules Chrome Model C638 is definitely an excellent, top-notch 24-bit display adapter.

**Rapier 24**



VideoLogic's Rapier 24 (\$2995) is a full-length adapter that ships with 3.5 MB of VRAM and 1 MB of DRAM. For acceleration, it uses a 32-MHz 34020 coprocessor and VGA pass-through. Using VideoLogic's timing-adjustment software, the Rapier 24 can also function with Macintosh monitors like the 20-inch Radius Pre-

cision Color or Rasterops's 2075. VideoLogic will also be releasing 4- and 8-MB DRAM expansion modules by the time you read this. At this writing, no pricing was available. Windows 3.x drivers ship with the unit and support 24-bit resolutions of up to 1152 by 882 pixels noninterlaced. After you mail in the warranty card, VideoLogic supplies Panacea's DLD386 Deluxe ADI/TIGA drivers for Autodesk products.

Of all the cards, the Rapier 24 proved

the most difficult to install. After first connecting the supplied pass-through cabling, I spent several hours trying to comprehend the confusing documentation artwork that explained the positioning of the board's myriad I/O address and IRQ jumpers. About 10 seconds into the procedure for installing the TIGA software, the system would lock up with an address conflict no matter what jumper settings I used. After repeated attempts, I finally gave up and moved on to other adapters.

*continued*

# Turn CodeView or Turbo Debugger into an "ICE"

## ...at a fraction of the price!

**W**hen your debugging needs go beyond what your current software can handle, you can now add the extra horsepower you need.

How? Just **PopUp Periscope!**

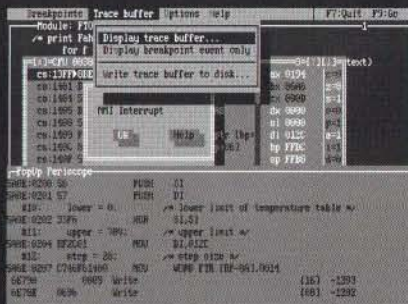
Periscope® Model IV's new popup software gives you easy access to its hardware *while* you use your favorite software debugger. You can capture a true system history with absolutely no slowdown. And set sophisticated real-time hardware breakpoints. You'll have an "ICE" as comfortable to use as the debugger you already know, for a lot less than you'd expect.

**Be ready for any debugging crisis—CALL TOLL FREE:**

**800/722-7006**

You can *rent* Model IV for as little as \$9 a day (minimum one month).

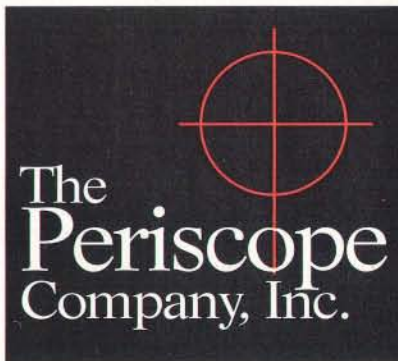
\*CodeView is a registered trademark of Microsoft Corporation. Turbo Debugger is a registered trademark of Borland International, Inc. Periscope is a registered trademark of The Periscope Company, Inc.



The PopUp Periscope software currently supports Turbo Debugger (shown above) and CodeView (shown below).



Periscope Model IV is available for systems with 286, 386DX, 386SX, 486DX, and 486DX2 CPUs running up to 33 MHz.



**1197 PEACHTREE ST., PLAZA LEVEL  
ATLANTA, GA 30361 • 404/875-8080  
FAX 404/872-1973**

Days later, I made one last attempt at installing the adapter and discovered that HIMEM.SYS must first be commented out of CONFIG.SYS—this was not mentioned in the manual. (Much later, I found this procedure mentioned in VideoLogic's addendum sheets.) After I rebooted the system, TIGA installation proceeded smoothly where I selected monitor and refresh-rate settings. After establishing the TIGA link and rebooting, I copied display resolution drivers from the 3½-inch installation floppy disk using Windows SETUP.

Under Windows, the display is stable and vibrant but fuzzy in comparison to other adapters. Running PhotoStyler with a 24-bit image opened and using the Alt-Shift and up- or down-arrow keys, I was able to instantly zoom in on the image at  $\times 2$ ,  $\times 4$ , or  $\times 8$  magnifications. With just a small portion of the image filling the entire screen, moving the mouse smoothly pans off-screen image data into the display. I liked this feature very much, as it made pixel editing a snap.

Although the Rapier 24's TIGA installation was very frustrating, the end results proved worthy of my efforts. The adapter's WinTach speed ratings were impressive, outpacing those of every other card, including Hercules' Chrome adapter, by a substantial margin. You can easily feel the speed differences this board brings to Windows, but VideoLogic would do well to rework the installation documentation. This and the slight fuzziness of the display aside, I definitely would have to give this adapter a high rating for its impressive speed alone. If you want Windows acceleration, this adapter screams.

#### All Picks, No Pans

Of the two inexpensive lower-resolution adapters, Genoa's Multimedia VGA 7900 certainly wins for lowest-cost 24-bit display adapter. Its display output quality is identical to that of Diamond's SpeedStar 24X, but the 24X is faster. If your 24-bit display needs also mandate Windows swiftness, then you should definitely consider the SpeedStar 24X.

In the higher-resolution group, VideoLogic's Rapier 24 proved the fastest. Its price may exempt some users from choosing it, but—installation problems aside—this unit really moves. Because of the #9GXiTC's easy installation, virtual screen resolutions, and multiple utilities, it proved to be an impressive unit. Even though it posted comparative median-to-swift speeds, I personally loved this unit. As an animator, I also liked the Truevision 1024-32 adapter; if your needs in-

clude video or animation, you should take a look at this product.

Although it fared slowly in the test times, Matrox's Impression-1024 adapter gets the nod for best 24-bit display quality at the lowest price. Next in line for the least expensive/best performance thumbs up would be the Hercules Chrome Model C638 adapter. This card is a great value, and it's fast. Based on its excellent 24-bit display output observed at a resolution of 1280 by 1024 pixels, Matrox's Impression-Ultra should definitely be considered by users with critical imaging demands. It's expensive, but its impressiveness

matches its cost.

Universally, all the boards performed as advertised, each meriting a commendation for speed, display quality, or price. There was not one board that I would recommend avoiding. Look over the adapters and choose one that fits your application and budget needs. Any one of them will make your 24-bit Windows display output look marvelous. ■

*Greg Loveria is a computer graphics and desktop publishing consultant, animator, and writer in Binghamton, New York. He can be reached on BIX as "loveria."*

#### COMPANY INFORMATION

##### Diamond Computer Systems, Inc.

(SpeedStar 24X)  
532 Mercury Dr.  
Sunnyvale, CA 94086  
(408) 736-2000  
fax: (408) 730-5750

**Circle 1105 on Inquiry Card.**

##### Genoa Systems Corp.

(Multimedia VGA 7900)  
75 East Trimble Rd.  
San Jose, CA 95131  
(408) 432-9090  
fax: (408) 434-0997

**Circle 1106 on Inquiry Card.**

##### Hercules Computer Technology, Inc.

(Hercules Chrome Model C638)  
921 Parker St.  
Berkeley, CA 94710  
(800) 532-0600  
(510) 540-6000  
fax: (510) 540-6621

**Circle 1107 on Inquiry Card.**

##### Matrox Electronic Systems, Ltd.

(Impression-1024, Impression-S, Impression-Ultra)  
1055 Saint Regis Blvd.  
Dorval, Quebec,  
Canada H9P 2T4  
(514) 685-2630  
fax: (514) 685-2853

**Circle 1108 on Inquiry Card.**

##### National Design, Inc.

(Volante AT2004)  
1515 Capital of Texas Hwy. S,  
Fifth Floor  
Austin, TX 78746  
(512) 329-5055  
fax: (512) 329-6326

**Circle 1109 on Inquiry Card.**

##### Number Nine Computer Corp.

(#9GXiTC)  
18 Hartwell Ave.  
Lexington, MA 02173  
(617) 674-0009  
fax: (617) 674-2919

**Circle 1110 on Inquiry Card.**

##### Opta Corp.

(MonaLisa)  
2525 East Bayshore Rd.  
Palo Alto, CA 94303  
(415) 354-1120  
fax: (415) 354-1144

**Circle 1142 on Inquiry Card.**

##### Radius, Inc.

(MultiView 24)  
1710 Fortune Dr.  
San Jose, CA 95131  
(408) 434-1010  
fax: (408) 434-6437

**Circle 1143 on Inquiry Card.**

##### Truevision, Inc.

(Truevision 1024-32)  
7340 Shadeland Station  
Indianapolis, IN 46256  
(317) 841-0332  
fax: (317) 576-7700

**Circle 1144 on Inquiry Card.**

##### VideoLogic, Inc.

(Rapier 24)  
245 First St.  
Cambridge, MA 02142  
(617) 494-0530  
fax: (617) 494-0534

**Circle 1145 on Inquiry Card.**

# YOUR DIRECT LINK CARD

For free product information, mail your completed card today. For quicker response, fax to 1-413-637-4343!

Yes, I want FREE information on the following products!

## 1. Circle the Numbers on Your Direct Link Card

Circle the numbers which are found on ads and articles in this issue or circle the product category number and receive information on all advertisers listed in that category.

## 2. Print Your Name and Address

Answer questions "A" through "E" and mail or fax card to 1-413-637-4343.

## 3. Product information will be rushed to you from the selected companies!

Fill out this coupon carefully. Please Print.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Country \_\_\_\_\_ Code \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

A. What is your primary job function/principal area of responsibility? (Check one)

- 1 MIS/DIP  
 2 Programmer/Systems Analyst  
 3 Administration/Management  
 4 Sales/Marketing  
 5 Engineer/Scientist  
 6 Other

B. What is your level of management responsibility?

- 7 Senior-level  9 Professional  
 8 Middle-level

C. Are you a reseller (VAR, VAD, Dealer, Consultant)?

- 10 Yes  11 No

D. What operating systems are you currently using? (Check all that apply)

- 12 PC/MS-DOS  15 Unix  
 13 DOS + Windows  16 MacOS  
 14 OS/2  17 VAX/VMS

E. For how many people do you influence the purchase of hardware or software?

- 18 1-25  20 51-99  
 19 26-50  21 100 or more

Windows 1992

90 96 98

Product Category Information	Disks & Optical Drives	7	Multimedia	19	Educational	30	Shareware	42
Circle the numbers below for information on the entire category of products you're interested in.	Diskettes/Duplicators	8	Printers/Plotters	20	Engineering/Scientific	31	Software Duplication	43
	Fax Boards/Machines	9	Programmable Hardware	21	Entertainment	32	Spreadsheets	44
	Graphics Tablets/Mice/ Pen Input	10	Scanners/OCR/Digitizers	22	Graphics	33	Unix	45
	Keyboards	11	Tape Drives	23	Macintosh	34	Utilities	46
	LAN Hardware	12	UPS	24	Mail Order	35	Windows	47
Hardware	Laptops & Notebooks	13	Software		Mathematical/Statistical	36	Word Processing	48
Accessories/Supplies	1	14	Business	25	Miscellaneous Software	37	General	
Add-In Boards	2	15	CAD/CAM	26	On-Line Services	38	Books/Publications	49
Bar Coding	3	16	Communications/Networking	27	Operating Systems	39	Recruitment	50
Communications/Networking	4	17	Data Acquisition	28	Programming Languages/Tools	40	Miscellaneous	51
Computer Systems	5	18	Database	29	Security	41		
Data Acquisition	6							

### Inquiry Numbers 52-233

52	78	104	130	156	182	208
53	79	105	131	157	183	209
54	80	106	132	158	184	210
55	81	107	133	159	185	211
56	82	108	134	160	186	212
57	83	109	135	161	187	213
58	84	110	136	162	188	214
59	85	111	137	163	189	215
60	86	112	138	164	190	216
61	87	113	139	165	191	217
62	88	114	140	166	192	218
63	89	115	141	167	193	219
64	90	116	142	168	194	220
65	91	117	143	169	195	221
66	92	118	144	170	196	222
67	93	119	145	171	197	223
68	94	120	146	172	198	224
69	95	121	147	173	199	225
70	96	122	148	174	200	226
71	97	123	149	175	201	227
72	98	124	150	176	202	228
73	99	125	151	177	203	229
74	100	126	152	178	204	230
75	101	127	153	179	205	231
76	102	128	154	180	206	232
77	103	129	155	181	207	233

### Inquiry Numbers 409-590

409	435	461	487	513	539	565
410	436	462	488	514	540	566
411	437	463	489	515	541	567
412	438	464	490	516	542	568
413	439	465	491	517	543	569
414	440	466	492	518	544	570
415	441	467	493	519	545	571
416	442	468	494	520	546	572
417	443	469	495	521	547	573
418	444	470	496	522	548	574
419	445	471	497	523	549	575
420	446	472	498	524	550	576
421	447	473	499	525	551	577
422	448	474	500	526	552	578
423	449	475	501	527	553	579
424	450	476	502	528	554	580
425	451	477	503	529	555	581
426	452	478	504	530	556	582
427	453	479	505	531	557	583
428	454	480	506	532	558	584
429	455	481	507	533	559	585
430	456	482	508	534	560	586
431	457	483	509	535	561	587
432	458	484	510	536	562	588
433	459	485	511	537	563	589
434	460	486	512	538	564	590

### Inquiry Numbers 766-947

766	792	818	844	870	896	922
767	793	819	845	871	897	923
768	794	820	846	872	898	924
769	795	821	847	873	899	925
770	796	822	848	874	900	926
771	797	823	849	875	901	927
772	798	824	850	876	902	928
773	799	825	851	877	903	929
774	800	826	852	878	904	930
775	801	827	853	879	905	931
776	802	828	854	880	906	932
777	803	829	855	881	907	933
778	804	830	856	882	908	934
779	805	831	857	883	909	935
780	806	832	858	884	910	936
781	807	833	859	885	911	937
782	808	834	860	886	912	938
783	809	835	861	887	913	939
784	810	836	862	888	914	940
785	811	837	863	889	915	941
786	812	838	864	890	916	942
787	813	839	865	891	917	943
788	814	840	866	892	918	944
789	815	841	867	893	919	945
790	816	842	868	894	920	946
791	817	843	869	895	921	947

### Inquiry Numbers 1123-1304

1123	1149	1175	1201	1227	1253	1279
1124	1150	1176	1202	1228	1254	1280
1125	1151	1177	1203	1229	1255	1281
1126	1152	1178	1204	1230	1256	1282
1127	1153	1179	1205	1231	1257	1283
1128	1154	1180	1206	1232	1258	1284
1129	1155	1181	1207	1233	1259	1285
1130	1156	1182	1208	1234	1260	1286
1131	1157	1183	1209	1235	1261	1287
1132	1158	1184	1210	1236	1262	1288
1133	1159	1185	1211	1237	1263	1289
1134	1160	1186	1212	1238	1264	1290
1135	1161	1187	1213	1239	1265	1291
1136	1162	1188	1214	1240	1266	1292
1137	1163	1189	1215	1241	1267	1293
1138	1164	1190	1216	1242	1268	1294
1139	1165	1191	1217	1243	1269	1295
1140	1166	1192	1218	1244	1270	1296
1141	1167	1193	1219	1245	1271	1297
1142	1168	1194	1220	1246	1272	1298
1143	1169	1195	1221	1247	1273	1299
1144	1170	1196	1222	1248	1274	1300
1145	1171	1197	1223	1249	1275	1301
1146	1172	1198	1224	1250	1276	1302
1147	1173	1199	1225	1251	1277	1303
1148	1174	1200	1226	1252	1278	1304

### Inquiry Numbers 234-408

234	259	284	309	334	359	384
235	260	285	310	335	360	385
236	261	286	311	336	361	386
237	262	287	312	337	362	387
238	263	288	313	338	363	388
239	264	289	314	339	364	389
240	265	290	315	340	365	390
241	266	291	316	341	366	391
242	267	292	317	342	367	392
243	268	293	318	343	368	393
244	269	294	319	344	369	394
245	270	295	320	345	370	395
246	271	296	321	346	371	396
247	272	297	322	347	372	397
248	273	298	323	348	373	398
249	274	299	324	349	374	399
250	275	300	325	350	375	400
251	276	301	326	351	376	401
252	277	302	327	352	377	402
253	278	303	328	353	378	403
254	279	304	329	354	379	404
255	280	305	330	355	380	405
256	281	306	331	356	381	406
257	282	307	332	357	382	407
258	283	308	333	358	383	408

### Inquiry Numbers 591-765

591	616	641	666	691	716	741
592	617	642	667	692	717	742
593	618	643	668	693	718	743
594	619	644	669	694	719	744
595	620	645	670	695	720	745
596	621	646	671	696	721	746
597	622	647	672	697	722	747
598	623	648	673	698	723	748
599	624	649	674	699	724	749
600	625	650	675	700	725	750
601	626	651	676	701	726	751
602	627	652	677	702	727	752
603	628	653	678	703	728	753
604	629	654	679	704	729	754
605	630	655	680	705	730	755
606	631	656	681	706	731	756
607	632	657	682	707	732	757
608	633	658	683	708	733	758
609	634	659	684	709	734	759
610	635	660	685	710	735	760
611	636	661	686	711	736	761
612	637	662	687	712	737	762
613	638					

# YOUR DIRECT LINK CARD

For free product information, mail your completed card today. **For quicker response, fax to 1-413-637-4343!**

See reverse side for card.

## 1. Circle the Numbers on Your Direct Link Card

Circle the numbers which are found on ads and articles in this issue or circle the product category number and receive information on all advertisers listed in that category.

## 2. Print Your Name and Address

Answer questions "A" through "E" and mail or fax card to 1-413-637-4343.

## 3. Product information will be rushed to you from the selected companies!

**BYTE**  
TNT MAILFAST  
FRG/BOS/700252/MO1  
P.O. Box 66  
Hounslow  
TW5 9RT  
England

PLACE  
POSTAGE  
HERE



**BYTE** 

# IMAGE DOCTORS

## Four programs for enhancing the quality of digital images

D. BARKER

**Y**ou've got an image problem: The scanned photograph of the company's new president is much too dark, and if you print it in the annual report, it'll look like she was photographed during a solar eclipse. Or the only photo of the company's new programming whiz shows him holding up a competitor's product, and you don't want to feature that in the corporate newsletter. Or you've got a scanned image that needs spiffing up or altering for either commercial or artistic purposes.

Used to be you'd solve these problems by getting a different photo, hiring a professional photo doctor, or buying a Macintosh or graphics workstation. But now there's a good collection of image-editing programs that run under Microsoft Windows. BYTE looked at three of these applications in a recent Windows special report (see "Image Magic," June BYTE). This time around, we're looking at packages that offer a range of capabilities, from basic tools for adjusting the quality of a scanned image to hefty toolboxes loaded with filters and enhancers, pencils and paintbrushes, and color-control capabilities.

Micrografx's Picture Publisher is by far the most sophisticated and well-equipped program in this bunch. Along with Aldus PhotoStyler and Adobe Photoshop, it's in the major leagues of personal computer-based image editing. ZSoft's PhotoFinish is a less ambitious variation on the Picture Publisher theme. Computer Associates' CA-Cricket Image and Media Cybernetics' Halo Desktop Imager dispense with drawing and painting tools to focus on sharpening up scanned pictures.

All these programs let you take a digital image and enhance its quality for use in a printed publication, an electronic document, slides, or a presentation. They all work with the most common graphics formats, and they all can handle 24-bit color pictures. Which package is right for you depends on the type of image problems you have to solve.

Ideally, you'd have a fast 486-based PC to run these programs, but I've used them

all on my Dell 33-MHz 386 (8 MB of RAM) and not cursed too often. And as you can see from the features table, or as you know if you've worked with image-editing software, the fully stocked programs have some heavy memory requirements. I'd suggest at least 8 MB of RAM. As for storage, it doesn't take long before a 100-MB hard drive seems tiny.

### Picture Publisher 3.1

Picture Publisher is a darkroom on disk, complete with photo-retouching tools, special effects, image-sharpening filters, and the type of graphics functions found in painting programs. Think of it as a combined digital darkroom and art studio. On the one hand, this is a package for working with images at a nuts-and-bolts level: adjusting basic components like brightness and contrast, correcting colors the scanner didn't handle so well, and turning images into four-color separations for printing. On the other hand, this is a package for working at a creative level: turning a staid photo into a snazzy graphic, blending elements into a composite image, or preparing a picture for incorporating into a desktop-published document (as shown in screen 1). Picture Publisher will not overwhelm the mechanic, nor will it leave the artist under-equipped.

Picture Publisher's straightforward interface displays the tool icons in a single vertical stack on the side of the screen. Most of the icons, when clicked on, spill out a horizontal row of related tools. Click on the painter's-palette icon, for example, and it shows you all the related tools; you can then pick the paintbrush, the airbrush, the smearing finger, the cloner, or the texture tool. The interface doesn't blitz you with a screenful of arcane icons.

The toolkit is extensive. Besides painting tools, there are freehand drawing tools; a tool for adding text to a picture (up to 80 characters, using any Windows-compatible fonts); tools for filling an area with colors, textures, or gradients; an eraser; a color-probe tool, which basically samples any color you point to in the image and then loads up the current painting tool with

that color; and a tool for zooming in on an image. Picture Publisher also has tools for sharpening or softening the edges in an image; you essentially brush over the edges you want to sharpen or smooth. You can use any of these tools to paint or draw on an image or create a new design.

Screen 1 shows a simple example of what can be done with Picture Publisher. Using the program's masking tools, I cut the girl with the glasses out of a scanned color photograph, copied her to the Clipboard, and then pasted her into a different background. The edges of the pasted image were a bit rough in spots, like a picture clipped from a magazine, so I used the paintbrush and smear tools to soften the edges and blend them into the background. With the color probe tool, I could easily paint pasted areas so they matched the color of surrounding areas. Using the zoom function, you can do some pretty up-close pixel editing; this is particularly helpful in spots where separate images merge. Picture Publisher excels at this sort of image doctoring.

The masking tools are one of the most

## BYTE ACTION SUMMARY

### ■ WHAT IMAGE EDITORS DO

They let you enhance the quality of digital images, in gray-scale or various color modes; the more sophisticated ones have graphics tools for retouching pictures and adding creative elements.

### ■ LIKES

The ability to manipulate colors and other components of an image; relative ease of learning and use; tools that are productive but also fun to use.

### ■ DISLIKES

The more powerful programs gobble up memory; some operations are very slow.

### ■ RECOMMENDATIONS

For professional-level color control and a good set of artist tools, Picture Publisher is excellent; however, depending on your needs, PhotoFinish, CA-Cricket Image, or Halo Desktop Imager might be more appropriate.

IMAGE-EDITING PROGRAM FEATURE COMPARISON

All these packages can enhance a scanned image, but PhotoFinish and Picture Publisher offer painting and drawing tools.

	CA-Cricket Image 1.0	Halo Desktop Imager 1.0	PhotoFinish 1.0	Picture Publisher 3.1
<b>Price</b>	\$295	\$139	\$199	\$495
<b>Filters</b>	Sharpen, smooth, remove noise, user-definable, special effects	Sharpen, smooth, blur, despeckle, special effects	Sharpen, equalize, diffuse, blend, remove spots, brightness, contrast, edge detection, special effects	Sharpen, smooth, lighten, darken, brightness, contrast, edge detection, special effects
<b>Graphics tools</b>	None	None	Paintbrush, airbrush, spray can, color picker, geometric drawing, patterns, lines and curves, clone tool, blend, smear, smudge, text	Paintbrush, airbrush, freehand drawing, textures, gradients, color picker, clone tool, text
<b>Area-selection tools</b>	Rectangular	Rectangular	Freehand, rectangular, polygonal, magic wand	Freehand, elliptical, rectangular, magic wand
<b>Gamma control</b>	Yes	Yes	Yes	Yes
<b>Scanning functions</b>	None	Prescan, calibration	Prescan, brightness and contrast adjustment, scaling, auto-stitching	Prescan, speed control, brightness and contrast adjustment, calibration, scaling, auto-stitching
<b>Adjust color map</b>	Yes	Yes	Yes	Yes
<b>Image conversion</b>	Yes	Yes	Yes	Yes
<b>Color separations</b>	Yes	No	No	Yes
<b>Halftones</b>	Yes	Yes	Yes	Yes
<b>File formats supported</b>	TIFF, Targa, BMP, PCX, GIF, PIX, WIN, BPX, CVP, JPEG	TIFF, Targa, BMP, PCX, GIF, MSP, IMG, CUT	TIFF, Targa, BMP, PCX, GIF, MSP	TIFF, Targa, BMP, PCX, GIF, JPEG, Photo CD

impressive facets of Picture Publisher. A mask lets you select part of an image when you want to make changes to just that part or to everything *but* that part. For example, say you have a photo of someone standing against a busy background and you want to change that background. With the freehand mask tool (the icon looks like an X-Acto knife), you can cut around the edges of the person and then either remove that person from the image or change everything outside the masked area. (You click on a button to make editing changes take place either within the masked area or outside it.) Screen 2 shows a masking operation.

In some ways, masking tools are like the marquee and lasso tools found in many graphics packages: They allow you to select an area to operate on. But Picture Publisher's masking functions are more intelligent than that. Besides the freehand and geometric mask-drawing tools with which you have to do the razor work yourself, the program has an AutoMask and a SmartMask. AutoMask will draw the mask

for you, tracing along the edge lines of an object. SmartMask, akin to the magic wand in some paint programs, knows about col-

**S**martMask, akin to the magic wand in some programs, knows about colors.



ors. It can sense changes in color and draw the mask accordingly; for example, if you want to mask a blue section surrounded by red, SmartMask will detect the color differences and select just the blue region.

The SmartMask works really well if the

breaks in color are sharp and well defined. A big yellow sun in a deep blue sky is something SmartMask can handle nicely. But in many images, things aren't so black and white, so to speak. One color often blends into a variation of itself or is darkened by shadow or brightened by light. In this sort of situation, SmartMask could be a little smarter. It won't always mask an area as precisely as you'd like. Fortunately, you can adjust the mask's range of color tolerance, based on the RGB color model, so it will recognize a wider range of blues, for example. As you raise the value (by percentages), the mask includes more colors. These adjustments will usually do the trick, but some dinking around is needed to set the range just right.

Picture Publisher's Color Shield is similar to the SmartMask but knows only about colors, not lines and shapes. It lets you select and mask part of an image based on color values. You can adjust the color range the shield will protect by opening a dialog box and typing in percentages. With a setting of 0 percent, for example, the



# CORELDRAW 3.0

## THE FIRST ALL-IN-ONE GRAPHICS SOFTWARE

In the information-packed '90s, good graphics are more important than ever to get your message across quickly and effectively. And now it's easier than ever to use graphics — with CoreDRAW 3.0! Everything you need is in one value-packed box. There is no longer any need to buy separate illustration, charting, painting, and presentation

packages. CoreDRAW 3.0 does it all with unmatched power and ease-of-use! And, as an unprecedented bonus, Corel has included a CD-ROM with over 14,000 clipart images and over 250 fonts! You'll get fingertip convenience for software that would otherwise occupy over 500 floppy disks and cost thousands of dollars.

### Outstanding Reviews!

*"CoreDRAW remains the easiest-to-use graphics product on the market...the ultimate graphics bargain!"*

PC Magazine, August, 1992

*"CoreDRAW - ALL THAT MOST PEOPLE WILL EVER WANT in the way of a graphics software..."*

William D. Harrel, Windows Magazine, July, 1992

*"Business users who need a wide variety of graphics functions shouldn't pass up this package. It is an amazing bargain."*

Luisa Simone, PC Magazine, August, 1992

*"CoreDRAW 3.0 is without doubt the most powerful, feature-laden, and best value for money graphics systems for Windows, at any price point. Full stop, end of discussion."*

Jon Honeyball, Windows Magazine UK, August, 1992

*"Endowed with paint, chart and presentation capabilities, this upgrade of the leading PC draw package is a stunning example of increased power at a reduced price."*

Christina Wood, PC WORLD, July, 1992

*"It's hard to find a more value-laden offering. We rate the value as excellent."*

Mike Heck, INFOWORLD, July 13, 1992

*"Total relative value of CoreDRAW modules, clipart and fonts is \$15,000."*

John Butler, Seybold Report on Desktop Publishing, July, 1992

*"CoreDRAW is a phenomenal bargain"*  
 Michael Burgard, PC/Computing, July, 1992

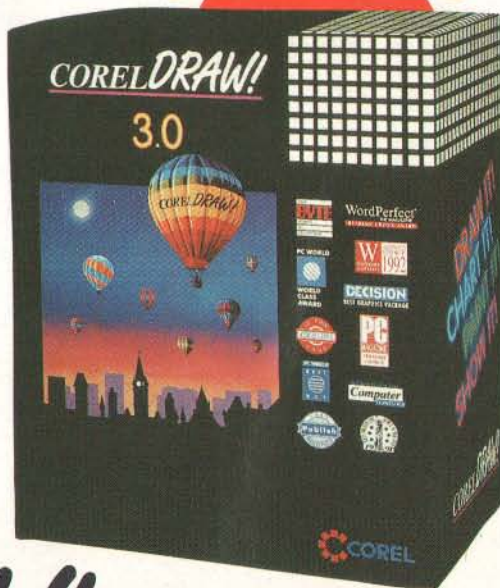
Suggested retail price  
**\$595**

### Outstanding Value!

Other companies need several packages to do what Corel does in one!

Company	Drawing/ Illustration	Charting/ Presentation	Photo- Editing	Fonts	Clipart	Total Cost
Micrografx	Designer	Charisma	Picture Publisher	251	3940	\$1685
Software Publishing Corporation	Harvard Draw	Harvard Graphics: (Windows)	Not Available	62	1600	\$1190
Aldus	Freehand	Persuasion	PhotoStyler	12	305	\$1885
Corel	CoreDRAW!	CoreDRAW!	CoreDRAW!	256	14,000	<b>\$595</b>

No wonder CoreDRAW is the world's best selling graphics software for Windows!



# CORELDRAW!

## 1-800-836-DRAW

**CORELDRAW WORLD DESIGN CONTEST**

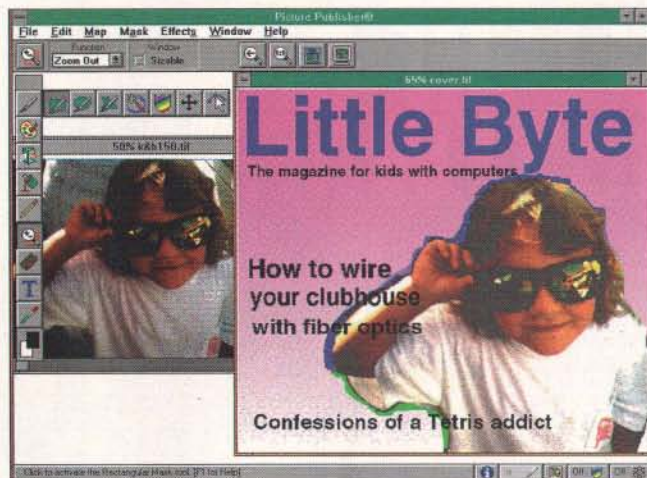
Enter now and win valuable prizes in the monthly contests (from Sept. '92 to April '93). Each monthly winner qualifies as a finalist in the Annual Design Contest in May '93.

Come see us at:  
**COMDEX/FALL '92**  
 LVCC, BOOTH #1116  
 Nov. 16-20th, 1992

FREE 24 hour Technical Support

CoreDRAW is MULTIPLATFORM for corporate standardization: Windows, OS/2, UNIX. And soon available on the MAC, and in 20 languages!

Call now for a free demo-disk and brochure!



**Screen 1:** With Picture Publisher's hefty set of sophisticated color controls and graphics tools, it's relatively easy to assemble something like a prototype of a magazine cover, shown here, or a montage. (Photo of girl by John Olson; used with permission.)



**Screen 2:** Picture Publisher's SmartMask (magic wand) at work. The dotted green-and-red line defines the masked area. Here, the mask has gone beyond what the user wanted (the black sunglasses frames), selecting other regions it interpreted as black.

shield will select only colors that match exactly; at 10 percent, it will select areas that are within 10 percent of that color's value, and so on.

Color control is one of Picture Publisher's main components. There's a whole set of tools for changing the RGB or CMY channels. You can modify the color map (or what some folks call a color lookup table), which changes the way the program displays a color. This can be done interactively, so you can preview the effects of your changes on the image you're working on. Its extensive set of controls for manipulating color channels, brightness and contrast, and hue and saturation makes Picture Publisher a professional-level image-editing program.

Picture Publisher also has a menu of special effects. These will let you do things like change the size of an image, rotate it, and reduce the number of colors. But it will also let you do some far-out things, like make the image look embossed, engraved, crystallized, windblown, rippled, textured with stucco, or like it's wrapped around a cylinder. I ran into some prob-

lems with these filters in 3.1, however; some effects would not work properly.

The Image Browser shows you miniaturized versions of graphics files instead of just listing their names. This is very handy if you can't remember the name of a file but know what it looks like. The drawback with this browser is that it has to build the thumbnail sketch the first time you bring a file into Picture Publisher. This can sometimes take minutes. You can turn off this function if you want.

Version 3.1 has auto-stitch capabilities. It will take different parts of a large image and sew them together seamlessly. This is especially useful if you've got a big picture that won't fit on your scanner bed or if you're using a hand scanner to bring in a wide image.

Picture Publisher tends to slow down when it comes to certain operations. With version 3.0, it can take as long as a minute and a half to open up a 150-dot-per-inch TIFF file (on a 33-MHz 386). Version 3.1 pulls in that same file in a minute. The newest version is also a bit faster at manipulating pixels. It can fill an area with a

pattern in 10 seconds, whereas 3.0 can take about 16 seconds.

While 16 or 90 seconds aren't significant lengths of time, they can add up to what feels like an eternity when you spend your day working with images. A minute here, a minute there—it all accumulates. With 3.1, you spend less time watching the little clock on the screen.

Picture Publisher isn't alone in its need for more speed. The kinds of compute-intensive jobs it's performing tend to take time. Even the excellent Adobe Photoshop, on a zippy Mac Quadra 950, can chew up the minutes when reading in a file or running an image through a filter. This is more of a plea to Micrografx: In the next version, please torque up the processing speed instead of adding features.

Like its rival, PhotoStyler, Picture Publisher is geared toward artistic types and graphics professionals, but you don't have to be an artist to use it effectively. In fact, the tools are so good that they can compensate for lack of artistic skill; a good eye, imagination, and the ability to work at the pixel level are just as important. This is an excellent package for anyone who has to scan or import images and then use them in either printed publications or electronic presentations. Picture Publisher provides everything you need except creativity. At its new price of \$495—a drop of \$300—Picture Publisher is a Texas-size deal.

**PhotoFinish 1.0**

From the company that brought us PC Paintbrush, this program is heavy on the graphics tools. One way to think of PhotoFinish is as Paintbrush with photo-processing tools. It doesn't have all the sophisticated color-manipulating capabilities of Picture Publisher, and it doesn't have as many filters and effects, but it's by no means a lightweight package.

PhotoFinish gives you an extensive set of tools. There's a paintbrush, a paint roller, an airbrush, a spray can, a pen for drawing freehand, a pencil for drawing lines and Bézier curves, a text generator, an "eyedropper" that will pick up a color you point at in an image and set that as the operative color, tools for smearing and smudging paints, tools for drawing geometric shapes, and an eraser that can delete something in the foreground without erasing the background. Special-effects filters can make an image appear embossed, blurred by motion, or made up of mosaic-like pixels.

Not all the tools will work with grayscale or 256-color images, however. This is an unfortunate set of limitations. All the tools work with 24-bit color images, so if you've got the right graphics card, you can

# Orchid now gives your baby two ways to scream.



*This little tyke just scored an awesome twenty-three million Winmarks.\**



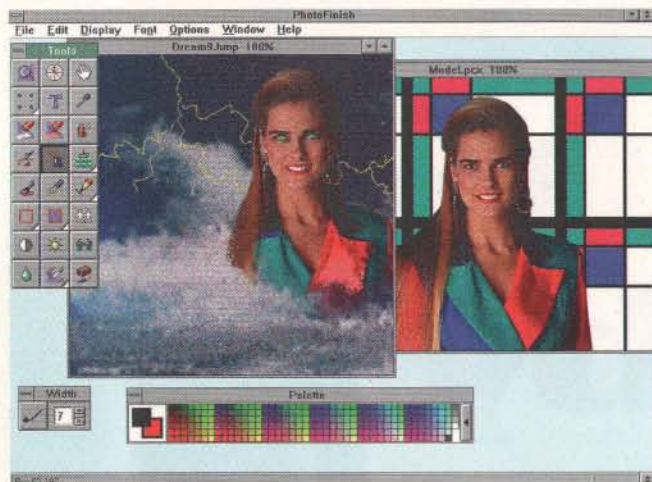
*This tiny mic offers a sound revolution in the way you communicate.*

The new Fahrenheit VA should give even the most demanding computer zealot ample reason to squeal with delight. Endowed with the scorching new S3 chip, this Windows accelerator lets you take unmitigated advantage of 3.1 by also letting you add voice notes (or audio post-its) to your documents.\*\* Of course it comes with our exclusive Voice Notes and HyperDriver (the fastest Windows driver available). Of course it lets you draw from a palette of up to 16.8 million colors with resolutions to 1280 x 1024. Of course we'll include a microphone. All for just \$299. For more details, call 800-7-ORCHID. Or fax: 510-490-9312. But please don't dawdle. We wouldn't want your PC to throw any unexpected temper tantrums.

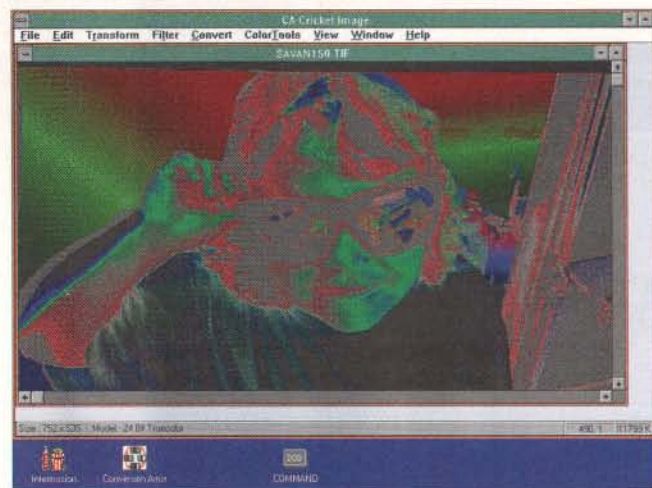


\*WinBench 2.5, 486-50 MHz, 1024 x 768-256 colors (70 Hz). \*\*Word 2.0, Excel 4.0 and other OLE apps. ©1992 Orchid, Fahrenheit, HyperDriver and Voice Notes are trademarks of Orchid Technology. All other trademarks are owned by their respective manufacturers.

**Circle 108 on Inquiry Card (RESELLERS: 109).**



**Screen 3:** *PhotoFinish has a well-stocked collection of painting and drawing tools. The woman was clipped out of a sample file that comes with the program and pasted against the sky. The other elements were done with the various paint tools.*



**Screen 4:** *CA-Cricket Image doesn't have the "creative" tools of Picture Publisher and PhotoFinish, but it does have some special-effects filters. The scanned photo here has been solarized.*

convert a file to 24-bit color. If you don't have the stuff to display 16.7 million colors, the program tries to simulate that by reducing the number of colors shown on the screen.

Screen 3 shows the PhotoFinish workspace and an example of the type of picture you can put together. The woman was cut out of a scanned image, pasted against the sky, and altered using the paint tools. Clouds and lightning were painted on top of the new image.

You can select areas within a rectangular frame (a marquee) or within irregular lines (a lasso). But there's also a magic wand; like Picture Publisher's SmartMask, it will highlight an area on the basis of color, and you can adjust the range of colors it will select. I find that PhotoFinish's magic wand usually requires more tinkering with the color range than Picture Publisher's SmartMask does.

PhotoFinish has a set of image-processing features that will let you change brightness and contrast, remove noise, soften colors, and sharpen edges. To my eyes, PhotoFinish doesn't reproduce scanned

colors as well as Picture Publisher does; they appear darker. Flesh tones, a good test of color accuracy, have an orange cast to them. You can fix this by adjusting color levels using RGB, CMY, or HLS (hue-luminance-saturation) color models.

You can scan from within PhotoFinish, using either a flatbed scanner, a hand scanner, or a video frame grabber. PhotoFinish, too, has a solution for pictures that are too big: It will stitch them together. From the scanner setup dialog box, you can adjust brightness and contrast, scale the size of the image, set the resolution, and change the levels of color. Although it lacks the calibration functions of Picture Publisher, this is a good scanning application.

One bad thing about this program is its Undo function. It erases everything you did since you last picked up the most recently used tool. This is okay if you want to clear all the paint you've put down, but what if you want to get rid of just the last brushstroke? You have to grab the eraser for that and then carefully cover your mistake. A multistep Undo—as found in Halo Desktop Imager—would be much better.

PhotoFinish is a very capable, easy-to-learn program for altering and enhancing digital images. It's not running neck-and-neck with Picture Publisher, but for people who don't need such a high-powered program, PhotoFinish is a winner.

**CA-Cricket Image 1.0**

Cricket Image lacks the painting and retouching tools of Picture Publisher and PhotoFinish, but it's strong in image-processing functions. The program, derived from a DOS package called PHIPS, has a set of filters for sharpening or smoothing edges, eliminating noise, and applying special effects that will do things like melt or solarize an image (see screen 4) or make it look like an oil painting, a pencil drawing, or a mosaic.

You can also define your own filters. Unless you know something about image-transformation algorithms, you'll be experimenting, but you don't need to understand theory to concoct these filters. Just by randomly entering coefficient values, you can produce some unique effects (which can be stored in a library of filters).

Cricket Image gives you good control over color. You can edit the colors in the palette and alter color values by changing the color response curve. RGB is the default color model, but the program can also use the CMYK, HLS, or HSV (hue-saturation-value) models. It can separate an image into either RGB or CMYK layers.

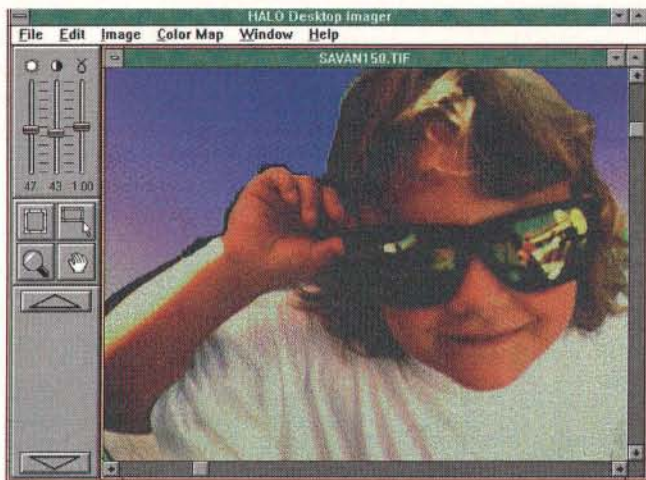
Conversion is one of Cricket Image's features. It will convert files to 1-bit black-and-white, 256-gray-scale, 16- or 256-color, or 24-bit-color. It will do color reduction to show a true-color image on a 16-bit color display.

The program's method for selecting a part of an image is limited: The only choice you have is a rectangular frame. You cannot scan from within Cricket Image, which is too bad.

Cricket Image loses points for its lack of speed. Changes can sometimes take minutes to process—special effects are the worst—while the program rattles the hard drive almost constantly. It's little compensation, but a red status line at the bottom of the screen lets you see how close to completion an operation is.

Cricket Image is not intimidating, but it's not as easily approachable as the other packages I reviewed. The command interface is almost entirely reliant on menus and dialog boxes. When you want to pick a color-reduction process, for example, you get a list of choices like Biased Median Cut and Uniform Quantization. The manual explains the differences.

This is more of a graphics or production professional's tool than an artist's or



**Screen 5:** *Halo Desktop Imager's spartan interface belies the capability of this utility. The slider bars let you adjust brightness and contrast and make gamma corrections.*

designer's tool. With its considerable color-control capabilities, Cricket Image is a good tool for anybody who has to take scanned or otherwise acquired images and fine-tune them until they look sharp.

**Halo Desktop Imager 1.0**

This is a different class of software from Picture Publisher and PhotoFinish, but Halo Desktop Imager is a crafty utility for working with scanned graphics. As screen 5 shows, this program presents a Spartan interface: a work area; three sliding bars for controlling brightness and contrast and making gamma corrections (as you move the bars, the effects are quickly reflected in the loaded image); two buttons for making rectangular frames around parts of an image; and a strip where you can set thumbnail sketches of images you're working with.

Besides these basic controls, Halo Desktop Imager has a few special effects. You can make an object look embossed, sculpted in metal, or reversed like a negative. There are filters that soften edges, sharpen edges, and remove noise.

One unusual feature lets you print out test strips to see what variations in contrast and other settings look like when you print the image. This is a handy way to find out which settings are best for a particular output device.

The program can stitch together the parts of an image scanned in in strips. Media Cybernetics says the software can print an image as big as 50 by 50 letter-size pages (I didn't test this). Halo Desktop Imager has its own screen-capture utility, which is a handy idea, but when I used it to grab a screen for this article, the program could not open the file after snapping the picture. Fortunately, North Coast Software's amazing Conversion Artist program *could* (see "A Few of Our Favorite Things," June BYTE, page 200). Halo will

use the company's proprietary technology for displaying 24-bit images on an EGA or VGA monitor, but to my eyes the result is not great.

There's one weird thing about the design of this program. It can recognize and save files in most common image formats, but with the Open command, you can bring in only TIFF files. To bring in files in other formats, including Windows mainstays like BMP and PCX, you have to use the Import command.

At \$139, Halo Desktop Imager is a good buy. It's a decent fit for someone who's doing desktop publishing under Windows and needs to clean up scanned images before putting them into a document. This package is a good choice for people who don't need graphics and retouching tools and who just need to sharpen images for use in documents and presentations. Version 2.0, slated for an October release, will be more capable and will include, Media Cybernetics said, the ability to produce color separations.

**Finding the Right Doctor**

While similar in nature, these four packages represent different aspects of the image-editing picture. Picture Publisher is a professional application. At a mechanical level, it will let you manipulate and refine every component of a digital image. At an artistic level, it will let you use a scanned image as the basis of a creative work. Although complex, it's not hard to get the hang of; plus, it's fun to use.

PhotoFinish isn't trying to match Picture Publisher, but it comes pretty close anyway. It's very capable and has a good set of painting tools. One of its most obvious differences is in the treatment of colors. If you look at the same scanned image with both programs, the Picture Publisher rendition will be more faithful, in terms of colors and highlights, to the original.

Cricket Image is a good workhorse application for refining brightness, contrast, color, and other graphics components. It has a fine set of filters and effects but lacks any artist tools. If you need fairly sophisticated image-processing functions but no graphics tools, this is one to consider.

Halo Desktop Imager is a functional little program with some nice touches, particularly the ability to print out test strips. For the person who isn't a graphics hacker but needs to capture screens or convert files and clean them up for other applications, it's a useful utility. At \$139, it costs about the same as some screen-capture packages that aren't nearly as capable.

As these four packages testify, there's a good range of image-editing applications for PC users running Windows. ■

*D. Barker is a BYTE technical editor covering applications software. You can contact him on BIX as "dbarker."*

**COMPANY INFORMATION**

**Computer Associates International, Inc.**

(CA-Cricket Image 1.0)  
1 Computer Associates Plaza  
Islandia, NY 11788  
(800) 342-5224  
(516) 342-6000  
fax: (516) 342-5329

**Circle 1221 on Inquiry Card.**

**Media Cybernetics**

(Halo Desktop Imager 1.0)  
8484 Georgia Ave.  
Silver Spring, MD 20910  
(800) 992-4256  
(301) 495-3305  
fax: (301) 495-5964

**Circle 1222 on Inquiry Card.**

**Micrografx**

(Picture Publisher 3.1)  
1303 Arapaho Rd.  
Richardson, TX 75081  
(800) 733-3729  
(214) 234-1769  
fax: (214) 234-2410

**Circle 1223 on Inquiry Card.**

**ZSoft**

(PhotoFinish 1.0)  
450 Franklin Rd., Suite 100  
Marietta, GA 30067  
(800) 444-4780  
(404) 428-0008  
fax: (404) 427-1150

**Circle 1224 on Inquiry Card.**

# LOOKING GOOD FOR LESS

## Five full-featured Windows word processors that cost less than \$250

MARK SCAPICCHIO

**W**hy would you want to buy a low-cost Windows word processor instead of one of the better-known higher-end alternatives such as Word for Windows, WordPerfect for Windows, and Ami Pro? What a low-cost alternative provides is a relatively fast path to solidly designed mainstay business documents—letters, memos, and reports combining eye-catching text and layout effects with a few simple graphics.

Because a low-cost program includes only the most important features, it's easier to find and learn the features you need most. With the best of these programs, a first-time user can—in about two or three hours—install the program, click through a quick tutorial, and crank out a professionally designed report that will definitely get a reader's attention.

This review looks at four popular Windows word processors in the \$199-to-\$250 price range: Lotus Write for Windows, a

trimmed-down version of Lotus's Ami Pro 2.0; Software Publishing's Professional Write Plus, a trimmed-down sped-up version of Ami Pro 1.2; Symantec's JustWrite 2.0; and Computer Associates' CA-Textor. I also took a peek at a bargain alternative, Spinnaker's Easy Working Word Processor, that lists for \$49.95. Easy Working provides a surprising range, but limited depth, of features (see the text box "Easy Working Word Processor: Easy on Your Wallet" on page 106).

When might none of the low-end word processors reviewed here be right for you? See the text box "Reasons to Step Up" on page 110 to see what the high-end packages provide that these don't. If your tasks require regular activity in one or more of the features listed in the text box, you should look at the higher-end word processing software or learn to live with reduced capabilities and/or more labor-intensive word processing.

### Criteria and Testing

To help you create the best-looking document in the shortest period of time, a Windows word processor must provide sound implementations of the following three features:

- **Styles.** A style (also called *paragraph style*) is a named collection of instructions for formatting a particular type of paragraph. For example, you might have a style named *Headline* that specifies bold, centered, 18-point Helvetica; a *Normal* style that specifies justified 10-point Times Roman with a first-line indent; and so on. With styles, reformatting a paragraph is as easy as selecting another style; reformatting all paragraphs of a particular type is as easy as modifying the appropriate style.

- **Frames.** Frames are boxes you can use to position text, graphics, and tables on a page. You might use a frame to position a graphic as part of a page header, to create a headline that spans across several columns in a multicolumn layout, or to create a sidebar around which you can wrap your main document text. The more options you have for positioning and formatting frames, the more quick layout effects you have at your disposal.

- **WYSIWYG display.** In an ideal WYSIWYG display, your document looks exactly the same on-screen as it will look when you print it. In reality, few Windows word processors—no matter what their cost—can achieve this ideal without a font management program such as Adobe Type Manager. WYSIWYG is especially important to users of portables, who usually don't have the luxury of test-printing a document several times until they get it right.

To test each program's command of these basics, I used it to create a "better" departmental memo—one that combines provocative headlines, a three-column layout, and a table of contents to create a document that was easier to read, easier to reference, and, ultimately, more effective. You may never need to create such a fancy document, but if your word processor can handle such heavy-duty formatting, it can knock off your day-to-day documents with ease. The table provides a quick features-comparison reference for the programs reviewed here.

### Lotus Write for Windows

Lotus Write does the basics better than any word processor in this roundup. Its styles let you control virtually everything

## BYTE ACTION SUMMARY

### ■ WHAT LOW-COST WINDOWS WORD PROCESSORS DO

Because of their smaller feature set, they let you create high-style documents quickly—sometimes within an hour or two after you install the program.

### ■ LIKES

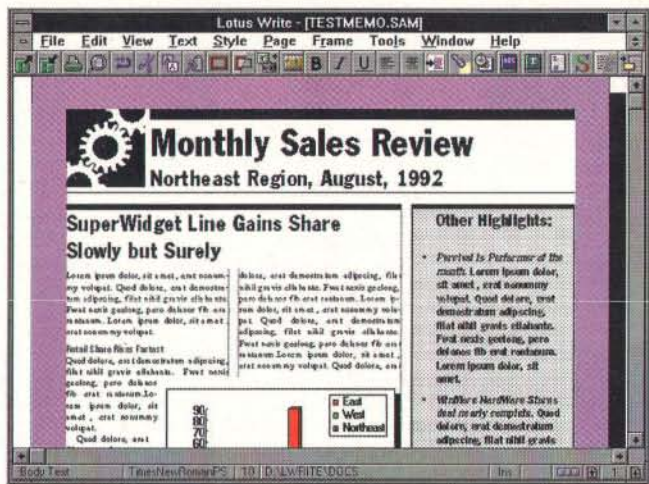
Styles for formatting paragraphs and documents quickly; frames for positioning text and graphics anywhere on a page.

### ■ DISLIKES

No in-document tables; no significant drive-space savings; slow performance on lower-end PCs and laptops.

### ■ RECOMMENDATIONS

You can create professional-looking documents more quickly and easily with Lotus Write than with any other program reviewed. For long documents, use JustWrite. Its formatting and layout capabilities are a step behind Lotus Write's, but its complete selection of power features and proofing tools is better suited to big text-crunching jobs.



**Screen 1: Lotus Write, a slimmed-down Ami Pro 2.0, includes ATM, 13 additional fonts, automatic numbering and bulleting, and the best layout tools in this roundup.**

by hand. You get quick math functions for totaling and averaging data in tables. For long documents, you get an outliner, table of contents and index generators, bookmarks, and footnotes and endnotes. For proofing, JustRight includes a thesaurus, a spelling checker, and a grammar checker. Of the programs tested, this one adapts most readily to big word processing jobs.

Unfortunately, JustWrite's styles are not very easy to create, modify, or use—especially when you compare them to the styles in Lotus Write and Professional Write Plus. The documentation is partly to blame; it doesn't mention that you must create a style based on an existing formatted paragraph. The style dialog boxes rely on confusing icons to convey your formatting choices; graphical examples like those in Lotus Write and Professional Write Plus's dialog boxes would work much better. You can't automate switching from one style to another, and you can't assign shortcut keys to styles for quick selection.

JustWrite's frames provide all the functionality and flexibility you could want. You can place them anywhere on a page; fill them with text, tables, or graphics; span them over columns; and wrap text around them. You can even rotate graphics within a frame. But to edit the contents of a frame, you must work in a separate document window. Usually, you have to go back and forth a few times between the frame and the document window until you're certain that things look the way you want them to look.

But thanks to its combination of layout capability and power features, JustWrite is the only program in this group that could be your first and last word processor. Like many users, you might find the extra learning time and occasional inconvenience

about a paragraph's formatting: fonts, attributes, alignment, indents, hyphenation, tabs, spacing, lines, and more (see screen 1). You can assign function keys to 10 of the styles so you can select them quickly as you type. You can even program a style to switch to another style whenever you finish typing a paragraph, so that, for example, when you finish typing a sub-head with the Subhead style, you're automatically switched to the Body Text style.

But if you're like most first-time users, what will impress you most are the ready-made Bullet and Number List styles that come with many of Lotus Write's templates (called *style sheets*). The Bullet style automatically inserts a bullet at the beginning of each paragraph (you can choose from several bullet characters) and creates a nifty hanging indent. The Number List style automatically numbers your paragraphs in succession and will renumber them if you add or delete paragraphs from the list.

Lotus Write's frames let you place text and graphics anywhere on a page. A Lotus Write text frame is virtually a page within a page: You can format it with margins, newspaper-style columns, and tabs. You can import, size, and crop any of 12 graphics file types in a graphics frame. You can wrap text around the frame, overlay frames to create special effects, and format frames with borders, colors, shadows, and even rounded corners.

Like its forerunner, Ami Pro 2.0, Lotus Write sets a standard of WYSIWYG that most other Windows word processors are still shooting for. Much of this is due to ATM (bundled with the program), which adds 13 new fonts to all your Windows programs and sharpens the display of all fonts on-screen. But Lotus Write is also

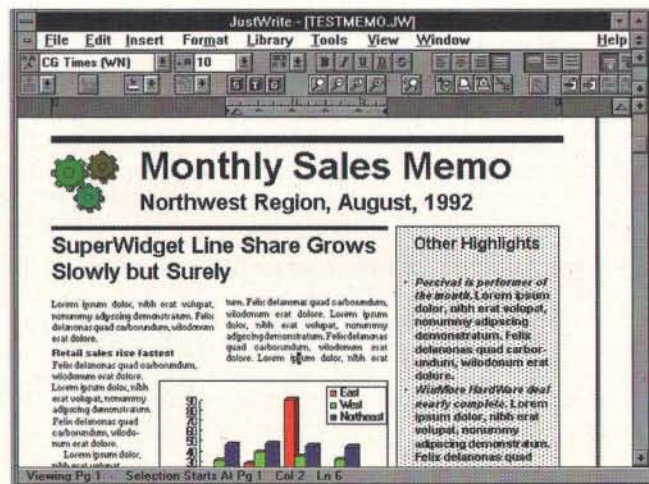
free of the display woes that plague other Windows word processors, such as lines of text that extend beyond the margins of the page if you change the view level. You always get an accurate representation on-screen of your printed page, no matter what view level you choose.

Given the features it might have borrowed from Ami Pro 2.0, Lotus Write's power features are a bit disappointing. There's one really sore point: Ami Pro's excellent table feature was omitted from Lotus Write.

### JustWrite

On the basis of features alone, JustWrite 2.0 is nearly a high-end word processor for a low-end price. Compared to top-flight word processors like Word for Windows and Ami Pro, JustWrite lacks little more than document automation (via macros and fields), drawing, and charting (see screen 2).

JustWrite's tables are easy to work with because you can size rows and columns



**Screen 2: JustWrite's many perks include a Microsoft Word-like interface, complete reference and proofing features, and more-than-adequate layout capability.**



**Screen 3:** Professional Write Plus, an optimized Ami Pro 1.2, excels at layout and includes automatic numbering and bulleting styles but has some trouble with font display.

by far the oldest release I reviewed. The styles and frames in Professional Write Plus are just a step or two behind those of Lotus Write. For example, you can't automate a Professional Write Plus style to switch to another style, draw frames with rounded corners or shadow effects, or specify a frame's exact location on a page via the keyboard. But other than that, you get plenty of fast formatting power. In particular, you get the same automatic numbering and bulleting styles that are found in Lotus Write, and you can also rotate a graphic within a frame—something that Lotus Write does not allow.

Unfortunately, Professional Write Plus's WYSIWYG capability lags significantly behind the other programs. In my tests, Professional Write Plus failed to recognize scalable TrueType fonts on the system; instead, it selected the closest printer font size available and then compensated with character and line spacing. As a result, characters often appeared too close or too

a small price to pay for a word processor that can grow with you.

**Professional Write Plus**

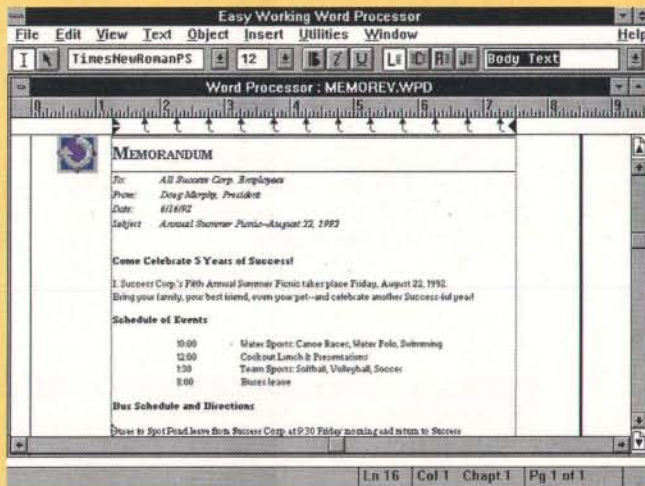
Professional Write Plus is a streamlined, faster version of Ami Pro 1.2. It carries for-

ward much of its progenitor's easy-to-use interface—intuitive menus and icon shortcuts, clean dialog boxes with graphical examples, and 24 ready-to-use style sheets (see screen 3). But it remains unchanged since its release in March 1991, making it

**EASY WORKING WORD PROCESSOR: EASY ON YOUR WALLET**

At first glance, Easy Working Word Processor from Spinnaker Software looks like a lot of software for the money. It includes Publisher's Powerpak, which adds 30 fonts, hollow and condensed text effects, and a sharper font display to all your Windows programs. It also packs an outliner, a spelling checker, a thesaurus, footnoting, and table of contents generation. Easy Working helps you through mail merge with support for printing labels and envelopes and with a card-file interface for creating and managing data files. It's pretty heady stuff for \$49.95 (see screen A).

Another pleasant surprise is that Easy Working's styles are quite capable—a bit less powerful than Professional Write Plus's, a bit more powerful and easier to use than JustWrite's. You can not assign function or shortcut keys to the styles or program one style to automatically follow another, but you get all the text format-



**Screen A:** For a list price of \$49.95, Easy Working Word Processor can zip off some surprisingly impressive documents.

ting power that you need.

Easy Working falls short in the layout department, however. Its frames are as good as any for sizing graphics, but you can't wrap text around a frame, and you can import only PCX, PCC, BMP, and TIFF graphics files—none of which is known for particularly sharp output on

desktop printers. You also can't create tables or multiple newspaper-style columns with the program.

A closer look at some of its power features may disappoint you. The outliner is fine for creating a document that looks like an outline, but because you cannot move headings and associated underlings together, it's not useful for reorganizing your thoughts.

You cannot create more than one master name and address list with the mail-merge card-file interface, and you can't change its preset field names. To mail to a portion of the list, you have to select records by hand. If you want to merge data outside the card file, you're limited to DBF- or comma-delimited files.

But if you just want to dash off a few better-than-average-looking memos from your laptop, Easy Working could be the answer. At a street price of \$30, it's a word processor you can afford to outgrow.



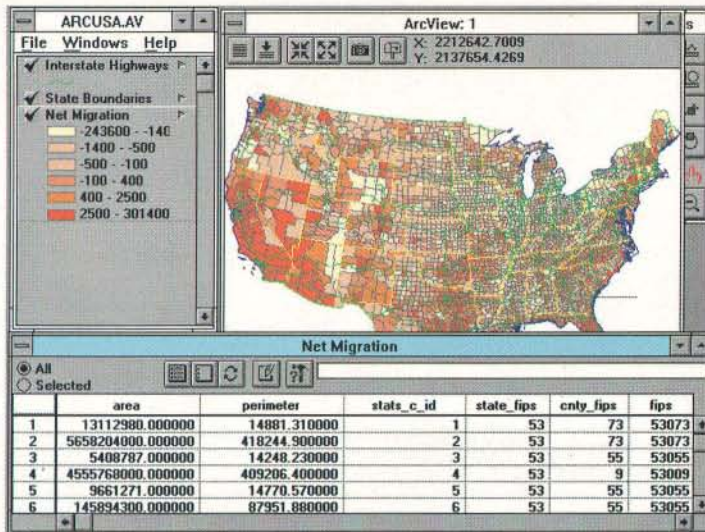
# ArcView™ for Windows.

## Geographic User Interface:

State-of-the-art human interface concepts bring advanced GIS functionality to your desktop in an intuitive, easy-to-learn environment.

## Database Queries:

Create sophisticated query expressions instantly. Features from the database that meet the criteria are highlighted in the tabular view and map displays.



## A True Network Product:

Run ArcView on PCs, Macintoshes®, UNIX® workstations, and access and integrate databases across networks.

## Output Options:

Save graphics and tabular listings to industry standard graphics files, or share data with other Windows-based applications.

"ArcView for Windows provides a major breakthrough in the usability of GIS, making it easy and fun for users to visualize, analyze, and explore geographic information."

—Jack Dangermond, ESRI President

ArcView™ for Windows™ is a powerful, new software tool that brings geographic information to your desktop. ArcView gives you the power to quickly visualize your data together with existing geographic databases and explore it in a different way. The world's first geographic user interface to spatial data, ArcView gets you up and running quickly with its unique approach to visualizing geographic phenomena.

ArcView is highly integrated with other Windows-based applications, creating a more comprehensive environment for analysis and desktop publishing, spreadsheet, database, word processing, publication graphics, and other Windows-based software applications to extend ArcView's power in the Windows environment.

ArcView displays and queries ARC/INFO® databases, and displays a wide variety of image data. Thousands of cities, counties, states, national agencies, and private businesses maintain large inventories of map and tabular data in ArcView-compatible formats. And with ESRI's ArcData™ Publishing Program, you have direct access to hundreds of off-the-shelf data products from the world's leading providers of digital data.

ArcView opens up the world of geographic information to everyone. Experience for yourself why ArcView is changing the way we look at the world. To order your copy of ArcView for Windows or for more information, call ESRI at (714)\* 793-2853, ext. 1375.

\* Effective Nov.14 - (909) area code replaces (714) area code

ESRI · 380 New York Street · Redlands, CA 92373

## Exploring your world has never been easier.

Copyright© 1992 Environmental Systems Research Institute, Inc. All rights reserved. ESRI and ARC/INFO are registered trademarks of Environmental Systems Research Institute, Inc. ArcView and the ESRI logo are trademarks of Environmental Systems Research Institute, Inc. ArcData is a service mark of Environmental Systems Research Institute, Inc. Other companies and products herein are trademarks of their respective companies.

Circle 194 on Inquiry Card (RESELLERS: 195).

# Decisions, decisions, decisions.

## Decider, decider, decider.

Down-sizing, upgrading, multi-platform environments. Today's computer hardware issues are more numerous, more difficult, more critical than ever. So how do companies make decisions?

According to a new IntelliQuest study, they turn to the only person qualified to decide. Someone like Bob Barrett. A person with 18 years in computers. Who oversees a technical staff of 75. And whose buying decisions and approvals affect nearly 3,000 users worldwide.

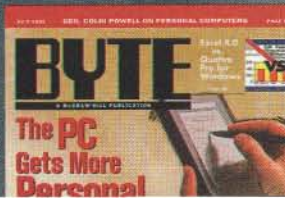
In other words, they turn to the BYTE reader. A full 92% of whom control the products and brands their companies buy.

If you want to reach an audience as influential as this, then yours is an easy decision—advertise in BYTE.

BYTE reader Robert N. Barrett, Vice President Management Information Systems, M/A-COM, Inc.

### It doesn't get bought without

© 1992 BYTE, a McGraw-Hill publication. For a presentation of the March 1992 IntelliQuest study, call (603) 924-2635.



far apart, although the line breaks were always accurate. Without an outliner, table of contents and index generators, conditional mail merge, tables, bookmarks, and glossaries, Professional Write Plus also loses in the breadth-of-features battle with Just-Right and CA-Textor.

**CA-Textor**

CA-Textor attempts to be too many things at once. On the one hand, it is small and efficient: It takes up just 2.3 MB of hard drive space—less than any of the other programs reviewed except Easy Working. On the other hand, it provides high-

**COMPARING LOW-COST WORD PROCESSOR FEATURES**

*Fundamental word processing, layout, and proofing features. Of the packages reviewed, Lotus Write and JustWrite offered the most features.*

(● = yes; ○ = no.)

Product	Lotus Write for Windows	Just-Write	Professional Write Plus	CA-Textor	Easy Working Word Processor
Company	Lotus Development	Symantec	Software Publishing	Computer Associates International	Spinnaker Software
Price	\$199	\$249	\$249	\$225	\$49.95
Drive space required	4.8 MB (without ATM)	5 MB	3.4 MB	2.3 MB	2 MB (without Publisher's Powerpak)

**Formatting and layout features**

Styles	●	●	●	●	●
Text frames	●	●	●	○	○
Tables	○	●	○	●	○
Graphics frames	●	●	●	○	●
Graphics scaling	●	●	●	●	●
Graphics rotation	○	●	●	○	○
Font management	● (ATM)	○	○	○	● (Publisher's Powerpak)
Simple bullets	●	○	●	○	○
Simple numbering	●	○	●	○	○
Clip art	●	○	○	○	○
Templates	●	●	●	●	●
Graph types imported	12	12	11	6	4
Columns	8	8	8	6	0
Dialog box examples	●	○	●	○	○

**Power editing**

Outliner	●	●	○	○	●
Footnotes/endnotes	●	●	●	○	●
Glossaries	○	●	○	●	○
Index	○	●	○	○	●
Table of contents	○	●	○	●	●
Spelling checker	●	●	●	●	●
Thesaurus	●	●	●	●	●
Grammar checker	○	●	●	○	○
Mail merge	●	●	●	●	○
Macros/fields	●*/○	○	○	○/●	○
Bookmarks	●	●	○	●	○

**Windows capabilities**

DDE	●	●	●	●	○
OLE	●	●	○	○	○
MDI	●	●	○	○	○

ATM = Adobe Type Manager.

MDI = multiple document interface—the ability to have more than one document open at a time.

\* Can only run Ami Pro macros; cannot create macros.

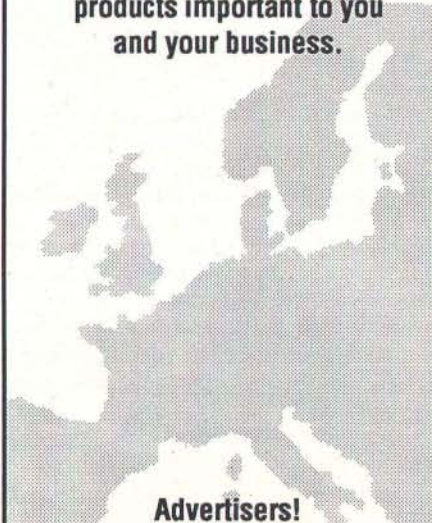
Announcing the



**The First Computer Postcard Deck Targeting the Exploding European Market!!!**

By the end of 1992, the European Community will be a \$14 trillion market. In fact, behind the US, it's the largest microcomputer market in the world!

**If you are a BYTE subscriber in Europe, watch for the new EURODECK coming to you soon! The BYTE EURODECK contains a selection of state-of-the-art products important to you and your business.**

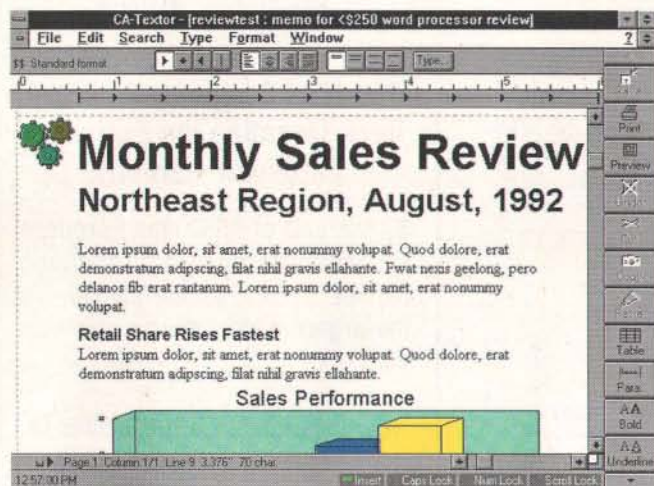


**Advertisers!**

**The BYTE EURODECK offers you a unique direct mail approach to increasing sales in this fast-paced computer market.**

Circulation of the BYTE Eurodeck is targeted to 50,000 computer buyers in over 20 countries in Western Europe. Take full advantage of the benefits of the upcoming unification of Europe in 1992! For information on the next BYTE EURODECK, call Jim Bail today at **603-924-2533!**

Companies outside of North America, please contact your local representative.



**Screen 4:** CA-Textor's scrolling, labeled icons are the best yet, but the program is hard to learn and its layout capabilities are nothing special.

powered word processing features like programmable fields and conditional mail merge. But the result is a weak implementation of the basics, little layout capability, and a semiselection of power features that most users will quickly outgrow (see screen 4).

To be sure, you'll find a few things in CA-Textor that you won't find in the other programs. The Library File Management system virtually eliminates the need to create subdirectories. With it, you can organize your documents into folders that can have names up to 12 characters long; what's more, you can use 40-character filenames within these folders. When you open the file, CA-Textor displays both the folder name and the filename in the title bar.

CA-Textor's icon shortcuts are the best of the bunch for two reasons. First, they're all labeled (e.g., Bold or Undo), so you'll never forget what an icon stands for. Second, they scroll along the icon bar so you have access to any icon in the program without having to resort to the menu.

But perhaps the most unique features in CA-Textor are the built-in British- and French-language spelling checkers and thesauri. These and the ability to import U.K.-only CA-SuperDB files make CA-Textor a product of choice for international applications.

For writing snappy memos here on the homefront, however, CA-Textor can prove frustrating. The style menu's commands are not intuitive: You'll never learn to use

them without studying the manual. You get no on-screen or keyboard shortcuts for selecting styles. You're instructed to assign cryptic IDs to each style for no apparent reason. And when you switch styles for another paragraph, CA-Textor automatically inserts a carriage return—a convention that you may never get used to.

CA-Textor has no frames; you can insert graphics into a line of text only. You can create tables with some effort, but you can't wrap text around them or edit them in the document display. And you cannot stretch text over several columns. As a result, CA-Textor can produce layouts no fancier than those you can create in a DOS-based word processor. It was unable to produce a satisfactory three-column sales memo in my tests.

CA-Textor's power features provide only half of what you need for a particular application. For in-document calculations, you get over 60 fields for calculating numbers, performing math and trigonometric functions, returning dates, and more. However, you can't use any of them within a table. For long documents, you get a table of contents generator and bookmarks but no outlining, indexing, or footnoting.

It's also worth noting that although each of the other programs I reviewed looks and feels like a high-priced alternative, CA-Textor looks and feels like no other word processor on the market. When you outgrow CA-Textor (and you almost certainly will), you may have no place to go to upgrade your inordinately hard-earned skills.

*continued*

## REASONS TO STEP UP

If you need some of the features listed below, you'd probably be better off with a high-end word processor than with one of the low-end alternatives reviewed here.

**In-text tables**—Perhaps the most underrated feature in word processing, in-text tables allow you to create side-by-side columns—perfect for creating scripts, instructions, forms, sideheads, and other documents where text must remain associated with the text next to it. Tables are also useful for importing spreadsheet and database data or for creating impromptu spreadsheets within your document. At the low end, JustWrite's and CA-Textor's table editors are suitable for creating only the most basic kinds of tables; no other reviewed program offers tables.

**Table math**—For calculating numerical data within tables. JustWrite features column and row summing and averaging. None of the other programs offers table math.

**Macros**—For everything from automating common tasks to creating custom word processing applications. High-end word processors feature facilities for recording, writing, and running macros; some include graphical dialog box editors. Lotus Write can run Ami Pro macros. No other low-end program can run or create macros.

**Programmable fields**—Useful for calculating math, referencing pages, numbering figures, and triggering macros. At the low end, only CA-Textor includes a wealth of math fields; no other program has fields of any type.

**More mail-merge control**—High-end

word processors let you set merge conditions and preview merged documents one by one; some include menu-driven merge assistants for creating envelopes and labels. At the low end, JustWrite and Easy Working Word Processor include comparatively limited label and envelope support.

**Drawing**—Tools, usually more sophisticated than those of Windows Paintbrush, for creating in-document illustrations. At the low end, only Easy Working Word Processor features some drawing capability.

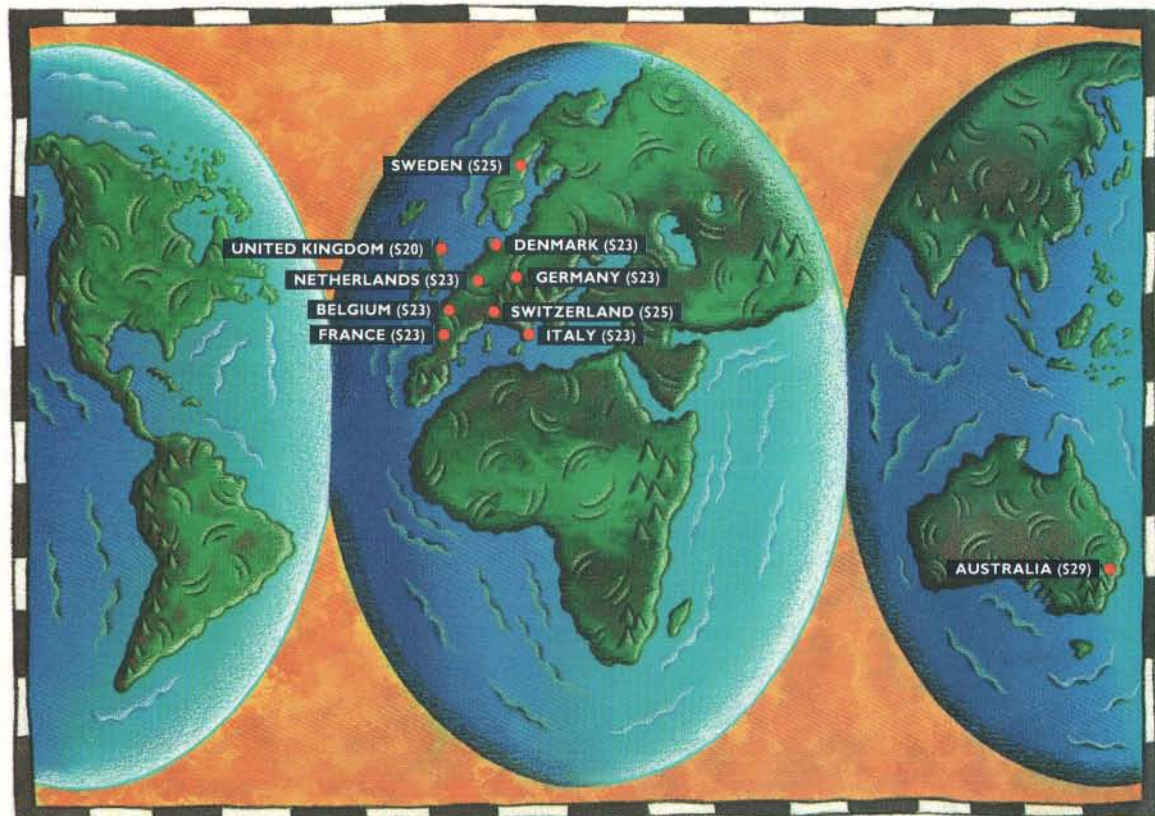
**Charting**—Quick tools for creating a graph within your document. Nothing like it at the low end.

**Equation editor**—A graphical, icon-driven editor for creating scientific equations; indispensable for engineering and scientific applications. Again, you'll find nothing like this at the low end.

**WHERE  
ON EARTH  
CAN YOU CALL US  
FOR AS LOW  
AS \$20  
AN HOUR?**

**N**ow you can connect with BIX, the on-line information service, at a fixed hourly rate from many cities around the world. Compared to packet switching networks, this saves you up to 75% depending on your location. There's

no application process. No character or packet fees. No extra charge for 2400 baud. And you're billed directly by BIX for your phone usage. Just call the access number nearest you, log on, and the world of BIX is at your fingertips.



BT Tymnet Access Information: (All amounts are U.S. dollars)

**AUSTRALIA** (\$29/hr): MELBOURNE (3) 4162146; SYDNEY (2) 290-3400 **BELGIUM** (\$23/hr): BRUSSELS (2) 725-5060 **DENMARK** (\$23/hr): COPENHAGEN 31-18-63-33 **FRANCE** (\$23/hr): PARIS (1) 47719133, (1) 46027003, (1) 46025750, (1) 46025500; LYON (7) 8478144 **ITALY** (\$23/hr): MILANO (2) 66-98-30-04 **NETHERLANDS** (\$23/hr): ALKMAAR (72) 155190; AMSTERDAM (20) 6610094; EINDHOVEN (4902) 45530; THE HAGUE (70) 3475032, (70) 3814641; ROTTERDAM (10) 4532002 **SWEDEN** (\$25/hr): STOCKHOLM (8) 294782 **SWITZERLAND** (\$25/hr): GENEVA (22) 782-9329; ZURICH (1) 730-9673 **UNITED KINGDOM** (\$20/hr): BIRMINGHAM (21) 6326636; BRISTOL (272) 255392; CAMBRIDGE (223) 845860; EDINBURGH (SCOTLAND) (31) 3132172; LEEDS (532) 341838; LONDON Baynard House (71) 4898571, Ealing (81) 5667260 **GERMANY** (\$23/hr): COLOGNE (221) 210196; FRANKFURT (69) 666-8131, (69) 666-4021; MUNICH (89) 350-7682

To learn more about BIX see our other ad elsewhere in this magazine.

**IF YOU READ THIS  
AD, THEN YOU'RE  
ONE OF BYTE'S  
500,000 READERS  
WHO IS:**

- **INFLUENTIAL**
  - **AUTHORITATIVE**
  - **TECHNICALLY-  
ADVANCED**
  - **KNOWLEDGEABLE**
  - **INNOVATIVE**
- AND MOST OF ALL  
... BUSY!**



When you want to buy, turn to the **BYTE Buyer's Guide** in the back for fast access to buying direct from reputable suppliers. From computers to CAD, notebooks to networks, memory to mathematics, you'll find it in the **BYTE Buyer's Guide**.

**Tell 'em you saw  
it in BYTE!**

## LOOKING GOOD FOR LESS

### Low or High End?

Even after you sort through the features of these low-end programs and pick the one that's best for you, you're still left with this nagging question: A year from now, will I wish I had bought a high-end word processor instead? The simple truth is that you can create more kinds of documents more easily with a high-end word processor.

You should definitely choose high end over low end if you plan to adopt a single standard word processor for your growing business. It's a lot easier to find employees who are already trained on a high-end program, and only high-end programs offer the macro capabilities you'll need to create your inevitable companywide applications. And by all means choose a high-end program if it's the only program with a specific feature or features you must have.

But if you are an enterprising lone wolf—say a consultant or independent sales representative—and you need to dash off only an occasional eye-catching letter or memo, a low-end program such as Lotus Write or JustWrite will more than fill the bill. ■

*Mark Scapicchio is a freelance writer and consultant based in Reading, Massachusetts, and the author of two books on word processing. You can contact him on BIX c/o "editors."*

### PROS AND CONS

#### CA-Textor

Best icon shortcuts; file management makes files easy to organize and find. Hard to learn; styles difficult to select and use; no frames; does not allow sophisticated layouts.

#### Easy Working Word Processor

Inexpensive; includes Publisher's Powerpak and 30 fonts; good range of features. Limited layout capabilities; features are easy to outgrow.

#### JustWrite 2.0

Tables; widest range of well-implemented power features. Poor documentation fails to explain use of styles; all frames must be edited in separate window.

#### Lotus Write for Windows

Styles are easiest to use; most capable frames; most reliable WYSIWYG of the products tested. No tables; no graphics rotation; icon overload.

#### Professional Write Plus

Very easy to learn and use; rotates graphics. Slow performance with graphics; some font display problems; needs a revision.

### COMPANY INFORMATION

#### Computer Associates International, Inc.

(CA-Textor)  
1 Computer Associates Plaza  
Islandia, NY 11788  
(800) 342-5224  
(516) 342-6000  
fax: (516) 342-5329

**Circle 1131 on Inquiry Card.**

#### Lotus Development Corp.

(Lotus Write for Windows)  
Word Processing Division  
1000 Abernathy Rd. NE  
Building 400, Suite 1700  
Atlanta, GA 30328  
(800) 831-9679  
(404) 391-0011  
fax: (404) 698-7653

**Circle 1132 on Inquiry Card.**

#### Software Publishing Corp.

(Professional Write Plus)  
3165 Kifer Rd.  
Santa Clara, CA 95051  
(408) 986-8000  
fax: (408) 980-0729

**Circle 1133 on Inquiry Card.**

#### Spinner Software Corp.

(Easy Working Word Processor)  
210 Broadway  
Cambridge, MA 02139  
(800) 323-8088  
(617) 494-1200  
fax: (617) 494-1219

**Circle 1134 on Inquiry Card.**

#### Symantec Corp.

(JustWrite 2.0)  
10201 Torre Ave.  
Cupertino, CA 95014  
(408) 253-9600  
fax: (408) 253-4092

**Circle 1135 on Inquiry Card.**

# FOUR WINDOWS DESKTOPS

**If you're not happy with Windows out of the box, try one of these desktop enhancers**

**DICK POUNTAIN**

**W**indows may now be the best-selling GUI for personal computers, but up to version 3.0 it lacked many of the convenience features that users expect, especially those who have experienced the Macintosh interface. The weak File Manager came in for most criticism, followed by the lack of truly hierarchical file folders (i.e., beyond one level) and the inability to place frequently used applications directly onto the desktop. These deficiencies spawned a slew of Windows enhanced desktops, including shareware products like BackMenu and commercial ones like Norton Desktop.

But Windows 3.1 corrects the worst of the flaws. The File Manager is now very usable, and you can drag and drop files and directories within it. This has not eliminated the market for enhanced desktops, but it has raised the stakes. To add value to Windows now means offering fully object-oriented features (e.g., data-driven applications), larger-than-screen virtual desktops, and more powerful job automation via macro and scheduler facilities. I recently examined four of the strongest contenders: Tool Technology Publishing's WinTools 1.0, Hewlett-Packard's NewWave 4.0, the improved Norton Desktop 2.0 from Symantec, and hDC Computer's Power Launcher 2.0. (See the table for a comparison of their features.)

## Installation and Resources

Getting Windows 3.1 properly set up (and keeping it that way) is no trivial matter. I've thus become very sensitive about applications that mess around with your system configuration and leave potentially dangerous dross behind when they have gone. A demonstration program that I'll not name locked me out of Windows recently when I deleted its DLLs! All four programs reviewed here were quite proper in this respect.

Both WinTools and Norton Desktop have proper Uninstall routines, and they

both ask you before they install themselves as the Windows shell (WinTools can also replace the Task Manager if you wish). Norton Desktop modifies both CONFIG.SYS and AUTOEXEC.BAT, but it keeps backups of both. Power Launcher replaces the Control Menu of every application with its own icon, but it has a Remove command that reverses this takeover; you must manually add SHELL=POWER.EXE to SYSTEM.INI to make it a shell. NewWave is a completely stand-alone system, and you must manually add a line to your AUTOEXEC.BAT file if you want it to run from boot-up.

Norton Desktop and NewWave are disk-eaters, requiring 8 and 10 MB, respectively, for a full installation, although Norton lets you choose which parts you need. By contrast, WinTools and Power Launcher are lightweights, needing only some 1.5 MB of disk space each.

## WinTools 1.0

WinTools describes itself as a "Windows customization system," but it is much more; it transforms the look and feel of Windows in a radically object-oriented way. The three key concepts in WinTools are *tools*, *desks*, and *desk sets*. A tool is any application or data file; a desk is a folder that can hold tools or other desks, hence providing fully hierarchical storage; and a desk set is a top-level desk that can be saved and loaded from disk. All these object types look the same, with large square icons surrounded by what I think are rather unattractive "picture frames." A special desk set called Basic Tools is automatically loaded with WinTools.

Almost everything you do in WinTools is a drag-and-drop operation, and no menu bar is visible on the screen (although you can click on the WinTools icon for a system menu). To change the name, font, or

## BYTE ACTION SUMMARY

### ■ WHAT WINDOWS DESKTOP ENHANCERS DO

These add-on products for Microsoft Windows enhance its desktop metaphor by adding features like hierarchical folders, virtual desktops, toolboxes, and object-oriented drag-and-drop mechanisms for creating data files.

### ■ LIKES

Both WinTools and NewWave are more deeply object-oriented than Windows; you focus on data, not applications. Norton Desktop has powerful, good-looking utilities and now features drag-and-drop. Power Launcher is excellent for automating tasks, and it assists power users who prefer the keyboard to a mouse.

### ■ DISLIKES

The frames around WinTools icons look plain ugly. NewWave restricts your choice of filename extensions. Norton Desktop doesn't support subdirectory tools on the desktop. Power Launcher's huge menus can get confusing. Virtual desktops may give trouble with some older DOS applications; check that your favorites work.

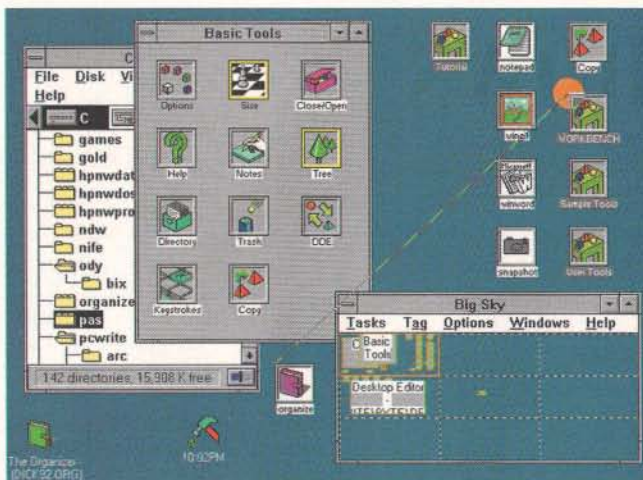
### ■ RECOMMENDATIONS

WinTools is a peek into the future, a wholly drag-and-drop interface, and I love it. If you don't want to change your ways so drastically, Norton Desktop may be more to your taste.

### ■ PRICE

WinTools 1.0, \$149  
NewWave 4.0, \$195  
Norton Desktop 2.0, \$149  
Power Launcher 2.0, \$99

**Screen 1:** This WinTools desktop contains desk sets and tools and an open desk set called Basic Tools. The yellow borders of the Size and Tree tools show that they are running. I asked the Organize tool about its membership, so it points to its parent desk set called Workbench.



**Screen 2:** The NewWave desktop contains objects, data files that invoke their applications when clicked on. Applications themselves live in the window called "Create a New..." where you use them as templates from which to create new objects.



colors of any object, you drag it onto the Options tool in Basic Tools. There's no need for a separate scheduler for automating tasks, because timing is a property of every object, which you set from Options. Similarly, dragging any object onto the Copy tool makes a copy of it, although of only its WinTools representation, not the physical file. You make new desks by copying old ones; only the container is copied, not the contents.

To make any DOS file into a tool, drag it into an open desk window. You can even make subdirectories into tools in this way. When double-clicked on, they display the WinTools directory manager, which is similar to the Windows 3.1 File Manager but separates tree and directory views into different tools. You can create a desk that contains your word processor tool and a directory tool for your documents and then drag files onto the editor.

I particularly liked the Close/Open tool. If you drop any desk icon onto this tool, all that desk's contents will be unpacked onto the main desktop; repeat the drop, and they are all put away again in one swoop. If

you have lots of tools out on the desktop, clicking the right mouse button on one identifies which desk it belongs in by drawing a "string" that connects their icons (see screen 1).

Big Sky is WinTools' virtual desktop manager, which creates a virtual screen 16 times the size of the real one. At installation time, you can choose to have this replace the Windows Task Manager. You activate it by double-clicking anywhere on the desktop. The Big Sky tool displays a reduced map of the virtual screen, in which you can move an application by dragging its tiny icon to another sector. Double-clicking on a sector in the map moves you to that screen. You can tag any tool or desk so that it follows you around from screen to screen. If you design your desks thoughtfully, Big Sky will give you many of the benefits of Xerox's advanced Rooms environment.

Other powerful features in WinTools include the Keystrokes tools, which are macros that pass keystrokes into an application, and DDE tools, which pass DDE messages to other applications.

I underestimated WinTools at first sight, perhaps because its crude icons give it a slightly toy-like appearance (however, you can change them). Nothing could be further from the truth. This is a fast, rich, and innovative environment. Remarkably, it occupies only half as much memory as the Windows Program Manager. Now I feel claustrophobic when I have to reluctantly return to a cluttered Windows screen.

### NewWave 4.0

As with WinTools, Hewlett-Packard's NewWave 4.0 takes a more strongly object-oriented approach than Windows itself. While installing all your applications, NewWave divides them into *tools*, which are ordinary applications that you run from the NewWave desktop by clicking on them, and *objects*, which behave as templates and do not appear on the desktop. Only the data files for objects appear on the desktop, and they call their associated applications when clicked on. You must link objects to their applications by a unique file extension.

To create a new document, you select "Create a New..." from the menu bar. This opens a dialog-box window containing all the template applications. Clicking on the Word icon in this box creates a new named document instantly on the desktop. NewWave comes with several object types already built in, such as Folder, Task, Text Note, and Object Storage. The latter type is a shared data repository for workgroups using a network (see screen 2).

NewWave searches your hard disk for applications to convert into object types and old data files to convert into objects. You don't even have to specify the file extension in advance. The first time you try to create an object from an unknown application type, NewWave asks you to save an empty file from that application, which it uses as a template for future objects. You can also save documents with content (e.g., a form or a letterhead) as different masters for the same type; the type's icon changes into a stack, and in the future you will be shown a list of masters whenever you create a new object.

NewWave has its own desktop, on which icons have an elegant, chiseled appearance. You can organize files hierarchically by nesting folders inside folders, as on the Mac, and then stowing them all away under the File Drawer icon. NewWave doesn't have a separate file manager (although you can still use Windows'), but listing nested folders in the Title directory, rather than Icon view, achieves the same effect. NewWave has an object finder that lets you search for objects by type or title (although, regrettably, not by



content) and presents a list of all the matches from which you can open objects by clicking on them.

Tasks are NewWave's macros, which you can create either by recording or by compiling from a powerful object-oriented macro language. There are two types: Agent tasks, which are stand-alone programs, and Menu tasks, which can be called from inside an object's menus and can be inherited by whole classes of objects. You can schedule tasks to automate chores (e.g., backing up disks) or trigger them on events like the opening of a certain file. NewWave supports shared views of objects, so the same object might be visible in many different folders and changing any one updates all the others. You can also form DDE or OLE links from objects to other Windows applications (even ones not installed into NewWave) and share data that way.

I found NewWave to be robust, but slow, with lots of disk activity even on my 8-MB system. It ran all my applications, including DOS ones, without a hitch. I couldn't get NewWave to associate different file extensions with the same application, even though it allows multiple file formats for file conversions. Similarly, you can't create objects that load multiple files (even with the same extension) into the same application, as you can with WinTools and Power Launcher.

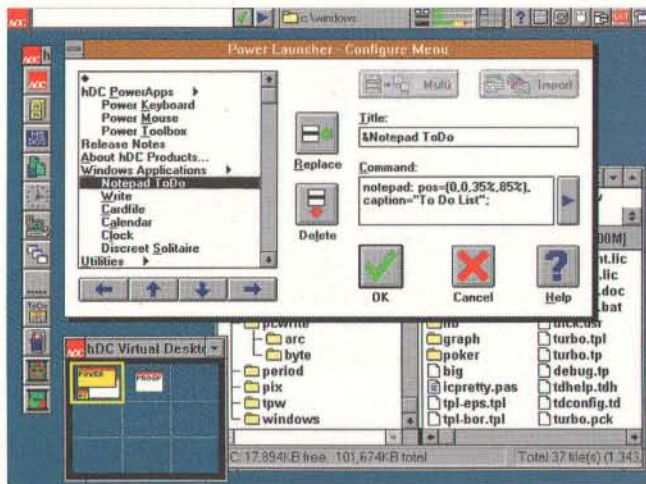
### Norton Desktop 2.0

Norton Desktop (see screen 3) is less radical than WinTools or NewWave and more of a straight add-on product. It originally provided an enhanced file manager, hierarchical program groups, desktop tool icons, and more than 20 powerful utility programs that you could use as stand-alone programs without installing the desktop. However, version 2.0 offers some significant improvements, which keep Norton Desktop in strong competition as a complete environment.

Norton's new file manager has the ability to let you expand and collapse directory trees by double-clicking, like Windows 3.1, while retaining the user-definable button bar (now expanded to 14 buttons), from which you can view, edit, and otherwise manipulate selected files directly. If you'd rather use the Windows File Manager, you'll find a Norton Tools option added to its menu bar. Drag-and-drop operations pervade the whole system now, not just the directory windows, so you can drop data files onto any desktop tool icon or onto an icon in a group window. When you do this, the cursor changes into a rocket to signify that you're "launching" an application.



**Screen 3:** This Norton Desktop screen shows examples of drive icons, desktop icons for commonly used tools like SmartErase, and a toolbox view of the Quick Access window that I have named Workbench.



**Screen 4:** At the far left is a vertical toolbox. Below it is the virtual desktop map. In the Configure Menu dialog box, you can see an example of Power Launcher's enhanced command syntax, which launches the Notepad at a fixed screen position.

The new Desktop Editor is an excellent ASCII text editor that leaves the Windows Notepad for dead. It has a multidocument interface like WinEdit, can open big files, and offers reassignable command keys, macros, regular expression search and replace, file compare, and document preferences you can save.

Other Norton utilities have been upgraded. Norton Backup can now handle tape drives as well as floppy disks. A proper macro recorder supplements the Batch Builder. You can save custom menu and default sets to disk. The Sleeper supports third-party screen savers (including After Dark) and comes with some nice new ones of its own.

Best of all, Norton Desktop 2.0 uses the Windows file-association dialog box, and it doesn't churn the disk for ages, as it used to. In fact, the program is much faster all around, particularly in saving the configuration and loading as a shell; I found it to be around four times faster here. Norton AntiVirus is now bundled with the Desktop; it installs itself as a TSR program. On my system, it takes less than 5 seconds to

scan my 100-MB hard drive during boot-up, which is an acceptable price for whatever security it provides.

A small but pleasing improvement is that desktop tool icons now snap to a grid, so they don't slide all over the place when you click on them. I also like the optional Toolbox view for program groups; all the icons appear packed together into a horizontal toolbar, without labels. There's now a network installation routine, and you can choose to have the NCD tree files for remote drives stored locally for speed.

In short, Norton Desktop 2.0 has added just about everything on my wish list, with the exception of the ability to drag subdirectories into a group.

### Power Launcher 2.0

Power Launcher from hDC Computer is different from the other three products in that it doesn't replace the Windows desktop; it enhances it. When you load Power Launcher, the Control Menu at the top left of every application window turns into a red hDC logo. Click on this and you get two cascaded menus, the original controls

WINDOWS DESKTOP FEATURE COMPARISON

Subtle differences of emphasis make each product more attractive for a particular type of user. (● = yes; ○ = no.)

	WinTools	NewWave	Norton Desktop	Power Launcher
Disk space (MB)	1.5	8-10	2-8	1.5
Uninstall	●	○	●	●
Hierarchical folders	●	●	●	○
Drag-and-drop	●	Only when printing	●	●
Icons on desktop	●	●	●	○
Virtual desktop	●	○	○	●
Macro recorder	○	●	●	●
Macro language	○	●	●	○
Scheduled events	●	●	●	●
Triggered events	○	●	○	● (on idle)
Pass keystrokes to application	●	●	●	●
Pass DDE messages	●	●	○	●
Toolboxes	●	○	●	●

plus the Power Launcher extras.

At the top of the screen is a snazzy-looking Toolbar from which you can issue DOS commands, see a bar chart of system resources, and launch Power Launcher's "microapplications." Power Launcher is elegant looking throughout, employing Borland-style customized OK and Cancel buttons. However, I found that its huge menus became irritating after a while.

Power Launcher adds five main features to Windows: enhanced command launching and menus, toolboxes, macros, scheduling, and a virtual desktop (see screen 4). Enhanced command launching solves the worst problem users have with Windows: its sheer indeterminacy. You never know what size a window is, where a window will appear, or what directory an application is looking at. With Power Launcher you know, because it lets you specify window size, position, and default directory in the launch command line. You can build your own cascading menus using enhanced commands, so you can launch your favorite utilities from any window.

You don't even have to remember the complicated new syntax, because there's a neat interactive tool called the Command Builder. It creates commands for you by pointing, dragging, and picking. If you do learn the full command syntax, you'll find that it enables you to do advanced things like passing DDE messages, running functions from DLLs, and passing keystrokes into a launched application.

Power Launcher's microapplications, which you access from the Toolbar, are called Power Keyboard, Power Mouse,

and Power Toolbox. They let you assign enhanced commands to keyboard combinations, mouse-clicks (with all three buttons), and floating toolboxes made from attractive 3-D buttons. You can associate all three of these features with applications so that a special toolbox appears every time you launch, for example, Microsoft Word. Drag-and-drop is now a feature of Power Launcher, either onto toolbox buttons or the Toolbar itself.

A macro facility can record mouse-clicks as well as keystrokes, and it lets you schedule a macro to run either at regular time-and-date intervals or whenever the computer is idling. This last option is extremely useful. I use it to run an incremental backup routine whenever I stop typing for more than 5 minutes.

The virtual desktop is much like the one in WinTools, except that it can hold up to 64 screens. The virtual screen map is nicer to use because, unlike with WinTools, you can pan smoothly over the virtual screen with the right-hand mouse button, as well as hopping a screen at a time. I did find that some DOS applications (PC-Write, a U.K. communications program called Odyssey, and List, a shareware directory) were not happy running full screen under the virtual desktop, though.

Power Launcher is the most powerful of the environments I tried. But it's also the most complicated. It's definitely a power user's tool.

**Four Winners**

All four of these Windows enhancers are rich enough to deserve long reviews to

themselves, and they all make Windows much nicer to work with. There are subtle differences of emphasis that make each product more suited to a particular type of user.

Both WinTools and NewWave are ideal for MIS managers to use in building turnkey interfaces for beginners on large corporate networks. Power Launcher is attractive for power users and developers, fast typists, and mouse-haters. Norton Desktop is perhaps more suitable for the average solo Windows user. You can even use some of these products in combination (e.g., I successfully ran Norton Desktop under WinTools' Big Sky), but I can't guarantee that unwanted interactions will not show up.

As one of nature's rebels, what thrills me about all these products is that they free you from the tyranny of the standard user interface we're all supposed to want and let you get back to some serious tweaking. ■

*Dick Pountain is a BYTE consulting editor based in London. You can contact him on BIX as "dickp."*

COMPANY INFORMATION

**hDC Computer Corp.**  
(Power Launcher 2.0)  
6742 185th Ave. NE  
Redmond, WA 98052  
(206) 885-5550  
fax: (206) 881-9770

**Circle 1164 on Inquiry Card.**

**Hewlett-Packard Co.**  
(NewWave 4.0)  
974 East Arques Ave.  
Sunnyvale, CA 94086  
(408) 720-3006  
fax: (408) 720-3506

**Circle 1165 on Inquiry Card.**

**Symantec Corp.**  
(Norton Desktop 2.0)  
10201 Torre Ave.  
Cupertino, CA 95014  
(408) 253-9600  
fax: (408) 255-3344

**Circle 1166 on Inquiry Card.**

**Tool Technology Publishing**  
(WinTools 1.0)  
1125 A St., Suite 107  
San Rafael, CA 94901  
(415) 257-4660  
fax: (415) 459-1079

**Circle 1167 on Inquiry Card.**

# STATISTICA/W

Windows, OS, Macintosh

**STATISTICA/W™** (for Windows) Complete Statistical System with thousands of on-screen customizable, presentation-quality graphs fully integrated with all procedures ■ Complete Windows 3.1 support, DDE, OLE, TT-fonts, multiple toolbars, right mouse button support ■ Unlimited numbers of data-, results-, and graph-windows ■ Inter-window integration: data, results, and graphs can be treated as objects and converted into one another in a number of ways ■ The largest selection of statistics and graphs in a single system; comprehensive implementations of: Exploratory techniques; multi-way tables with banners (presentation-quality reports); nonparametrics; distribution fitting; multiple regression; general nonlinear estimation; stepwise logit/probit; general ANCOVA/MANCOVA; stepwise discriminant analysis; log-linear analysis; factor analysis; cluster analysis; multidimensional scaling; canonical correlation; item analysis/reliability; survival analysis; time series modeling; forecasting; lags analysis; quality control; process analysis; experimental design (with Taguchi); and much more ■ Manuals with comprehensive introductions to each procedure and examples ■ Hypertext-based Stats Advisor expert system ■ Extensive data management facilities (spreadsheet with long formulas, block operations, advanced Clipboard support, DDE hot links, relational merge, data verification, powerful programming language) ■ Batch command language and macros also supported, "turn-key system" options ■ All output displayed in Scrollsheets™ (dynamic, customizable, presentation-quality tables with toolbars, pop-up windows, and instant 2D, 3D and multiple graphs) ■ Extremely large analysis designs (e.g., correlation matrices up to 32,000x32,000, unlimited ANOVA designs) ■ Megafiler Manager with up to 32,000 variables (8 Mb) per record ■ Unlimited size of files; extended ("quadruple") precision; unmatched speed ■ Exchanges data and graphs with other applications via DDE or an extensive selection of file import/export facilities ■ Hundreds of types of graphs, including categorized multiple 2D and 3D graphs, matrix plots, icons, and unique multivariate (e.g., 4D) graphs ■ Facilities to custom design new graphs and add them permanently to menu ■ On-screen graph customization with advanced drawing tools, interactive stretching and resizing of complex objects, interactive embedding of graphs and artwork, special effects, icons, maps, multi-graphics management, page layout control for slides and printouts; unmatched speed of graph redraw ■ Interactive rotation, perspective and cross-sections of all 3D and 4D graphs ■ Extensive selection of tools for graphical exploration of data: fitting, smoothing, overlaying, spectral planes, projections, layered compressions, marked subsets ■ Price **\$995**.

**Quick STATISTICA/W™** (for Windows) A comprehensive selection of basic statistics and the full graphics capabilities of STATISTICA/W ■ Price **\$495**.

**STATISTICA/dos™** (for DOS) A STATISTICA/w-compatible data analysis system ■ Price **\$795**.

**Quick STATISTICA/dos™** (for DOS) A subset of STATISTICA/dos statistics and graphics ■ Price **\$295**.

Domestic sh/h \$10 per product; 14-day money back guarantee.

Circle 122 for DOS. Circle 123 for MAC.

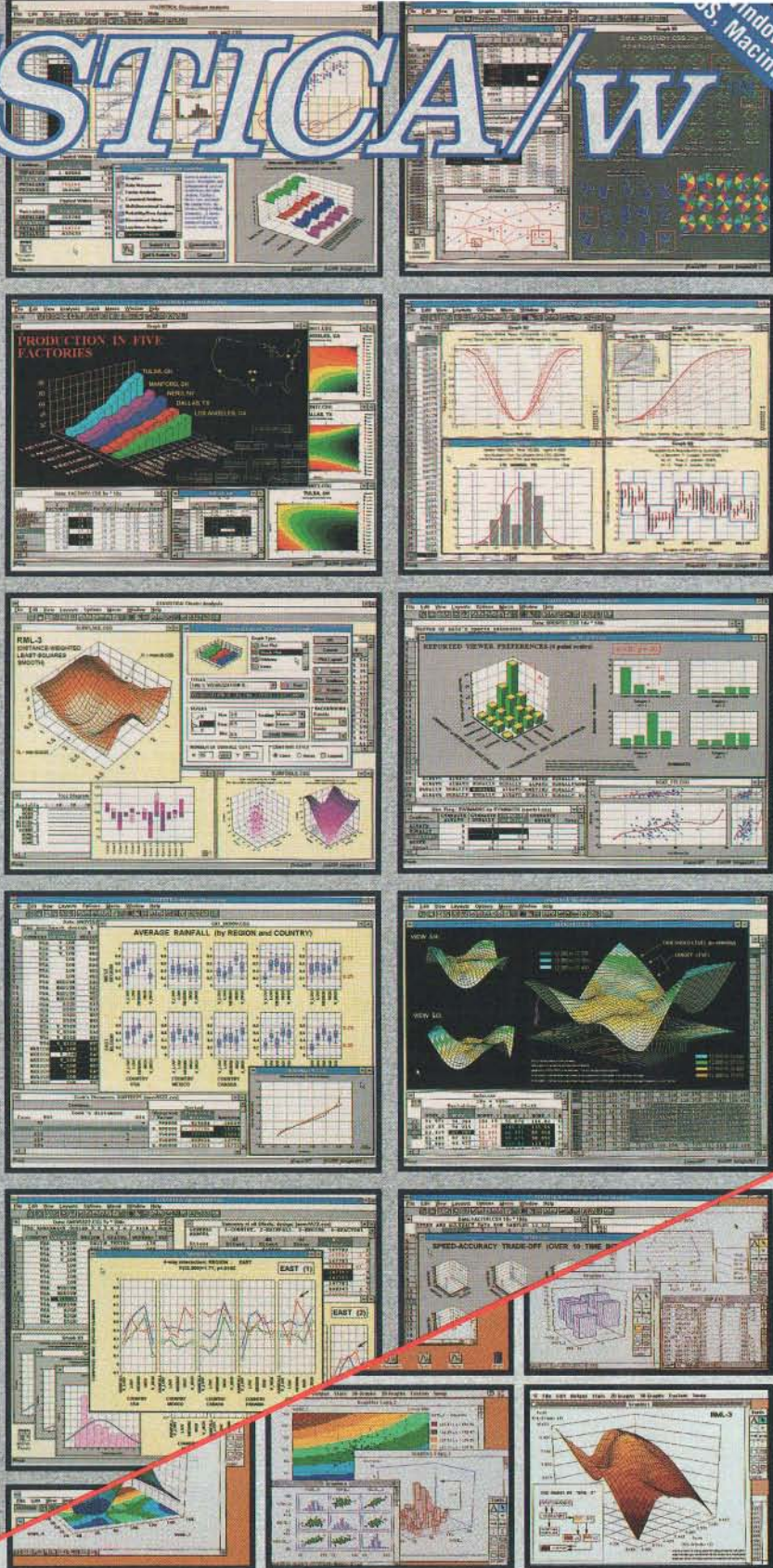


**StatSoft™**

2325 E. 13th St. • Tulsa, OK 74104 • (918) 583-4149  
Fax: (918) 583-4376

Overseas Offices: Statsoft of Europe (Hamburg, FRG), ph: 040/4200347, fax: 040/4911310; StatSoft UK (London, UK), ph: 0462/482822, fax: 0462/482855; StatSoft Pacific (Melbourne, Australia), ph: (03) 663 6580, fax: (03) 663 6117; StatSoft Canada-CCO (Ontario), ph: 416-849-0737, fax: 416-849-0918. Available From: CORPORATE SOFTWARE and other Authorized Representatives Worldwide: Holland: MAB Julsing, 071-230410; France: Version US (1) 40590913; Sweden: AkademiData 018-240035; Hungary: Dagent Kft 186-5782; Belgium: TEXMA 10 61 16 28; South Africa: Osiris 12 663-4500; Japan (Macintosh): Three's Company, Inc., 03-3770-7600; Japan (DOS and Windows): Design Technologies, Inc., 03-3667-1110.

StatSoft, STATISTICA/W, Quick STATISTICA/W, STATISTICA/Mac, Quick STATISTICA/Mac, STATISTICA/DOS, Quick STATISTICA/DOS, and Scrollsheet are trademarks of StatSoft, Inc.



**STATISTICA/Mac™** (for Macintosh) A STATISTICA/w-compatible, comprehensive data analysis and graphics system designed for the Macintosh ■ large selection of statistical methods fully integrated with presentation-quality graphics (incl. EDA, multiplots, a wide selection of interactively rotatable 3D graphs; MacDraw-style tools) ■ Unlimited size of files ■ Full support for System 7, incl. "Publish and Subscribe" ■ Price **\$595**.

**Quick STATISTICA/Mac™** (for Macintosh) A subset of STATISTICA/Mac: a comprehensive selection of basic statistics and the full graphics capabilities of STATISTICA/Mac ■ Price **\$295**.





**CTX:**

**Bringing the**

**Whole World**

**Into View**

**With an extensive warehouse distribution network, and the compliance with multi-national safety standards, CTX monitors are now reaching users world-wide.**

For years, the full line of CTX products has been constructed for unparalleled quality with world-wide compatibilities in mind. Built with ergonomic ingenuity and trend-setting technology, now CTX SVGA and Professional Series (CPS) offer more advanced features than ever:

• **NON-INTERLACED, FLICKER FREE**

Flicker-free images at VESA non-interlaced 72 Hz refresh rate reduce eye strain and headaches.

• **HIGH RESOLUTION**

High resolutions up to 1280 x 1024 add to image sharpness and increase the amount of information on Windows.

• **FULL SCREEN DISPLAY**

The simple adjustment of external controls results in a Full Screen Display — eliminating dark margins around the image. This ability is a tremendous advantage in Graphics User Interface and Multimedia applications.

• **FLAT-SQUARE SCREEN**

CTX large screen models (CPS-1560 & 1760) are manufactured with flat-square picture tubes for CAD/CAM and imaging applications. This increases display clarity while reducing image distortion and screen glare.

• **PROGRAMMABLE SCREEN CONTROL**

CTX Professional Series features digital controls which allow for easy adjustment of picture size and position. With 15 memory channels preset to the most common video standards, these monitors adapt quickly to a wide range of video cards. The Multiscan Series (CMS) provides up-front knobs for screen adjustment while retaining all other advanced features of CPS models.

• **LOW RADIATION (MPR II)**

Low Radiation models are available for additional protection against electromagnetic radiation emitted by all CRT's during normal use.

Model	5468A	5468NI	CPS-1460	CPS-1560	CPS-1760
Scan H:	30-38KHz	30-50KHz	30-60KHz	30-60KHz	30-65KHz
Freq. V:	50-90Hz	50-90Hz	50-90Hz	50-90Hz	50-90Hz
Resolution (Max.)	1024x768 /43.5Hz	1024x768 /60Hz	1024x768 /70Hz	1024x768 /70Hz	1280x1024 /60Hz



For more information, or to bring a world standard monitor within your reach, call CTX today.

**Circle 83 on Inquiry Card (RESELLERS: 84).**

Where Monitors are CTXcellent

**CTX INTERNATIONAL**  
20530 Earlgate Street  
Walnut, CA 91789  
714/595-6146  
Fax 714/595-6293

**CTX SOUTH**  
6090-F Northbelt Parkway  
Norcross, GA 30071  
404/729-8909  
Fax 404/729-8805

**CTX EAST**  
146 Division Place  
Hackensack, NJ 07601  
201/646-0707  
Fax 201/646-1998

**CTX MIDWEST**  
500 Park Blvd., Suite 425  
Itasca, IL 60143  
708/285-0202  
Fax 708/285-0212

**CTX OEM**  
1225 E. Crosby Rd., A21  
Carrollton, TX 75006  
214/416-9610  
Fax 214/245-7447

# TRACKING THE ELUSIVE PROJECT

## Four project management packages that can help you be on time and on budget

DANIEL YAHDAY

Imagine knowing before even starting a project whether it will meet its deadline, how to eliminate many of your resource-allocation hassles, and how to perhaps save your company a great deal of money. PM (project management) software programs attempt to do just that.

PM software also lets you detect and correct even the slightest deviations from your plan long before they become troublesome. You can easily plan and clearly communicate your schedules with charts. An outliner facilitates managing large projects, and an earned-value analysis clarifies the status of your projects by comparing actual and planned work costs at any given time.

But not all PM programs provide the same benefits. Different packages model real life with varying levels of flexibility, and there are fundamental differences in the way each program achieves this flexibility. The art of PM software selection is to find the right mix of features and flexibility for your particular projects.

For this review, I looked at four Windows-based products that list for under \$1000: Computer Associates International's CA-SuperProject for Windows 2.0a, Microsoft Project for Windows 3.0, and Symantec's On Target 1.0 and Time Line for Windows 1.0. These products cover a wide range of user needs, but each has an emphasis for different types of users. (See table 1 for a comparison of package features.) Together they are generally easier to use than DOS-based programs and, with a few exceptions, also share many common features.

I evaluated the programs using Microsoft Windows 3.1 on a 33-MHz 486 with 8 MB of RAM and a 16-millisecond 213-MB hard drive. To take full advantage of graphics under Windows, I used a 17-inch NEC MultiSync 5FG monitor with a resolution of 1280 by 1024 pixels and a refresh rate of 72 Hz provided by a Num-

ber Nine GXi video card. While speed and resolution are important, you can get along OK with a 16-MHz 386, 4 MB of RAM, and a 14-inch VGA monitor. For benchmark testing, I used a medium-size project containing 200 tasks (see table 2).

Most projects consist of a set of tasks and the resources required to perform them. To begin such projects, you place tasks on a time table called a Gantt chart. Then you assign resource amounts (e.g., worker-hours) to each of the tasks that are represented by column bars; this is called a *resource histogram*. The program mul-

tiplies resource usage by cost rates and draws a cost-distribution chart based on the resulting dollar amounts for each time period. Task relationships are best illustrated by a network of nodes (i.e., tasks) and arrows (i.e., dependencies), which is known as a PERT chart.

To schedule tasks, you define their dependencies and estimated durations. For example, a five-day task may depend on the completion of a nine-day task. Thus, the first task finishes on the ninth day, and the second one starts on the tenth day. Applying this scheduling technique to all tasks in a project reflects the concept of the CPM (Critical Path Method). In CPM, there is always at least one path of consecutive tasks with the longest duration that will determine the length of the project. This path is the most critical to perform on time.

### Common Features

All the programs that I reviewed for this article offer Gantt, PERT, resource, and cost-distribution charts; CA-SuperProject also offers a Work Breakdown Structure chart. You can use a program's built-in chart presentations, or *views*, or design your own. You can create, edit, and update

## BYTE ACTION SUMMARY

### ■ WHAT PM SOFTWARE DOES

It can help you plan and control your projects better by considering task dependencies, resources, project priorities, required dates, and budgets.

### ■ LIKES

Windows-based PM software brings scheduling and control to a wide audience. The number of keystrokes or commands required is declining, thanks to new standards of ease of use.

### ■ DISLIKES

Setting up projects and updating them is still a tedious and complex chore. Vendors must concentrate more on simplifying PM processes rather than just the required keystrokes. Microsoft Project's Planning Wizards and Time Line's Co-Pilot may be the beginning of this kind of assistance.

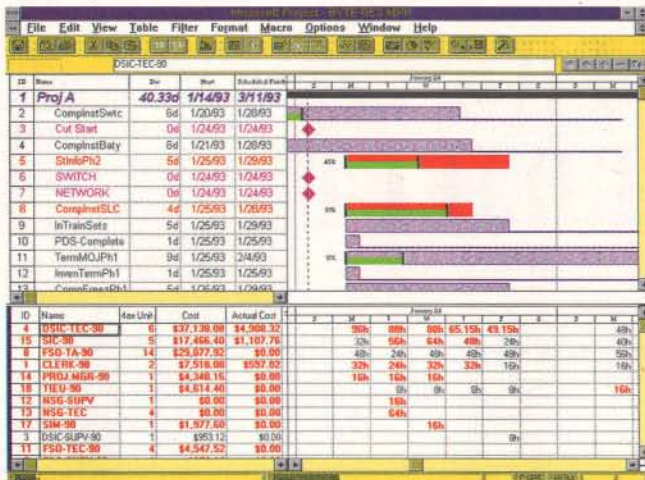
### ■ RECOMMENDATIONS

For extensive flexibility and analysis, consider CA-SuperProject. It can manage your project to the last detail. For high-quality presentations, Microsoft Project does the best job.

### ■ PRICE

CA-SuperProject for Windows 2.0a, \$895; LAN node, \$695  
Microsoft Project for Windows 3.0, \$695;  
LAN node license, \$556  
On Target 1.0, \$399;  
LAN node, \$349  
Time Line for Windows 1.0, \$699; LAN node, \$599

**Screen 1: The appearance of Microsoft Project's bars, text, and layouts is entirely your choice, thanks to the program's near-perfect customization capabilities.**



tasks on all charts and interactively manipulate them. Projects can contain thousands of tasks if you have enough RAM. All the programs support project and resource calendars that allow you to define the days of the year during which all or certain resources do not work. A task ID is the row number, except with CA-SuperProject; with this program, the task ID is used to uniquely identify every task.

Multiproject scheduling is conceptually different from one program to another. Resource management varies greatly in capabilities, options, and results, although all the programs support automatic resource leveling, which considers real-life resource constraints (see the text box "Resource Leveling" on page 121). With resource leveling, costs are based on resource rates and, usually, task-overhead amounts.

While all four programs allow you to track a project's progress and analyze its performance against a baseline plan, the amount of user control differs from package to package. Symantec's programs let you post progress only in terms of percentage completed, and actual dates become target dates. Microsoft Project offers more control over progress reporting. CA-SuperProject has a comprehensive tracking facility.

All charts can be customized for look and content and then saved and printed as they appear on-screen. Except for CA-SuperProject, all the programs offer font selections and user-defined field names. They also support different ways of assigning resources to summary tasks and linking them. All the programs have a useful print-preview function.

All the programs can import and export standard file formats. Alternatively, you can use the Windows Clipboard to instantly cut, copy, and paste any highlighted subset. All four programs are installable

on a LAN. File locking is turned on when you load a project.

All the programs offer on-screen tutorials, but these differ in depth and coverage. Generally, on-line help is sophisticated and illustrative and offers instant answers to problems. The information is context-sensitive or indexed, using hypertext. Information differs in its depth and sensitivity to your problems.

Data entry is done on a spreadsheet, a form, or a chart. By simply clicking and dragging, you can change the field width of a tabular view or the length of a bar in a Gantt chart; you can move bars in a similar fashion. Only CA-SuperProject does not offer such control. An outline can be expanded or collapsed with a toolbar icon or a double-click.

### Microsoft Project 3.0

If you need your presentations to look good, you can't go wrong with Microsoft Project for Windows 3.0. For \$695, you get all the essential functions in a versatile, flexible, and highly customizable package. Project is available in both Windows and Mac versions and allows data transfer between these two platforms.

Project offers what may be the best array of customization functions available. Its PM functionality is good, although not very flexible. The main views are the best of the four packages; the underlying concept of synchronized yet fully customized top and bottom views is what makes it special. And if you don't like what you see, you can easily customize the views to fit your needs (see screen 1). You also can choose what type of chart goes into the top or bottom part of a window, what information each includes and how they look, and where the window is split.

You can change the height of any row or the name of any field and even add as many as 10 text fields and 10 yes/no flag

fields to your project tasks. You also can separately customize the bars and columns of any task. The only shortcoming of Project's Gantt chart feature is that it does not draw task relationships (i.e., a logic bar chart). The bottom part of a split screen is best for viewing resource utilization. The usage spreadsheet, which shows load amounts per period for multiple resources, is an alternative view to the typical histogram of a single resource.

When your schedules must look good, your words must be spelled correctly. Project helps you achieve that with its spelling-checker function. If there is a special form, view, table, filter, or macro you want that is not available in Project, you can easily design it. You can make tools appear in the program's menu or as toolbar icons.

In addition to the included task macros, you can automate your most difficult tasks by selecting from the program's powerful menu-driven macro facility or by writing your own. The program lacks only a keystroke recorder module. Your custom macros will work on different sets of fields, tables, or views.

Multiple task editing is the most powerful and unique feature of Microsoft Project. With it, linking, adding, changing, or posting progress for multiple tasks is as easy as with a single task.

Project's multiproject scheduling feature is one of the best. It lets you link and resource-level up to 20 independent projects that share a resource pool. Linking tasks across projects is simple; it's done by establishing a DDE link using the Windows Clipboard. You can visually merge multiple projects into a single window to view, edit, or print tasks of all projects from one spot.

Although the resource leveling is much improved over that of the previous version of Project, there are cases in which it does not resolve resource conflicts or calculates inefficient projects. Another problem is that you have to turn on the Automatic Calculations feature to detect circular links during the process of setting dependencies. But if an error is detected, further explanations of the problem and instructions to remedy it are available.

If Project's charting capabilities are not sufficient for you, you can use the bundled Microsoft Graph software, which includes capabilities beyond the typical PM chart functions. With Graph's numerous features and options, you can produce a sophisticated and powerful array of charts never before seen in PM software. Also, Project supports a powerful print-preview function with a zoom option, multipage preview, and a handy page-setup feature. It also lets you insert page breaks, so the

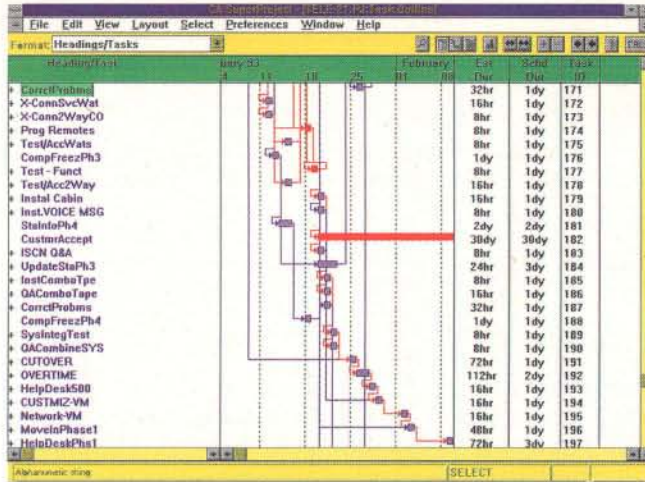
next phase in an outline begins printing on a new page.

Project's excellent Planning Wizards feature offers an on-screen guide and a tutor that performs for you the tedious—and sometimes difficult—set of keystrokes needed to accomplish some repetitive routines. But unlike macros, Planning Wizards offers help along the way and gives you much more control over the operation. Planning Wizards actually teaches you while showing you how to do things, something that more software should do.

### CA-SuperProject 2.0a

If your primary concern is project information quality, you should consider CA-SuperProject for Windows 2.0a. Although specifically rewritten for Windows, this \$895 package looks and feels like the older, proprietary graphical DOS version. CA-SuperProject accommodates a nearly complete array of modeling options and the widest range of PM functionality of the four packages. Also, its ability to communicate across different platforms while retaining a similar user interface and functionality can be a major advantage for organizations that combine DOS, Windows, and VAX/VMS operating environments.

CA-SuperProject lets you define virtually every task type, relationship, and date constraint, as well as use an outline for



Screen 2: CA-SuperProject's logic bar chart offers the clearest picture of your project logic and even tries to optimize the way dependencies are drawn.

tasks, resources, and even account codes. You can combine them with a powerful on-screen cross-tabulation view of resource and cost amounts. You also can include probability fields that determine your chances of finishing the project within a certain time frame.

The program supports comprehensive multiple-project and resource management facilities. You can assign consumable material resources, define variable resource loads and cost rates, and use overtime cost and availability factors. You can load and view more than one project at once, each in a separate window. You can also link pro-

jects, view their combined resource conflicts with a common resource pool, and automatically level them. The only limitation is that you cannot link tasks across projects.

CA-SuperProject offers a comprehensive import/export facility that includes many formats, options, and file types. The program also lets you add imported data to existing values, such as costs, or replace them.

While CA-SuperProject looks like any other Windows product, it lacks some of the feel and sophistication that Windows users are accustomed to. For instance, it

## RESOURCE LEVELING

Resource leveling is the function by which PM (project management) software resolves resource conflicts—namely, resource overloads. The decision about which tasks will be delayed is the core of the leveling process, and it's based on heuristic methods devised by each program's software developers.

The end result of the leveling process is usually a longer project. But because of the different heuristic methods used by each program, they each calculate a different schedule and project length. The ramifications of these differences may mean a great deal to users who need to plan and control their own resources. They could mean the difference between the success or failure of a project or between winning or losing a proposal.

There may be more than one way to measure the success of this function, but

the simplest and most important way is to look at the resulting length of a project under the same resource availabilities with different programs. Furthermore, more than one leveling strategy affects the results. The most effective ones are resource constraining, leveling by priorities, and, the most revolutionary, resource contouring.

The problem of ranking PM software in order of efficiency of leveling is that a diversity of projects calls for different leveling methods, and each user may prefer a different leveling strategy. While the time it takes to level may vary by as little as seconds or as much as hours, project durations may reflect differences that vary by days or even years. And leveling may not always give a clear advantage to one product; conclusive results are not as simple to achieve as you might think.

However, a recent independent study of this issue, the 1992 Resource Leveling Study, concluded that leveling results are not random after all. Conclusive results were obtained by repeating the leveling tests on each of several projects dozens of times under each of the tested strategies.

The study, which involved seven popular packages, concluded that two programs clearly do a better job than the rest: CA-SuperProject for Windows and the DOS version of Time Line 5.0. Each does a great leveling job under different strategies. The program with the worst results in the test was Microsoft Project 1.0.

For additional information about the 1992 Resource Leveling Study, contact I Soft Decision, Inc., P.O. Box 6123, San Rafael, CA 94903, (415) 491-1616; fax (415) 491-0151.

PROJECT MANAGEMENT SOFTWARE COMPARED

**Table 1:** A comparison of the four reviewed packages' features. (ALAP = as late as possible; effort-driven tasks are based on input in worker-hours; ● = yes; ○ = no.)

Product	Disk space required (MB)	Tasks per project	ALAP task type	Effort-driven tasks	OLE	DDE	Logic bar chart	Toolbar icons	Macro language
CA-SuperProject 2.0a	2.80	10,000	●	●	○	○	●	17	○
Microsoft Project 3.0	6.80	9999	●	●	●	●	○	27	●
On Target 1.0	1.60	1000	○	○	○	○	●	12	○
Time Line 1.0	4.00	8000	●	●	●	○	●	35	○

does not support DDE or OLE for linking data and objects dynamically among projects or applications. You can select different character sizes for a printed report, but there is only one screen font. Pop-up forms are not actual Windows information boxes: They pop up exactly where you don't want them, and you cannot move them. Changed preferences are not automatically saved, and the Save command is *outside* the form—not where you would expect it to be.

Usually a double-click is equivalent to making a selection and pressing Enter, but with CA-SuperProject, a double-click generates a task. CA-SuperProject offers a limited print-preview function and spreadsheet-layout customization. In addition, the software does not use the usual click-and-drag layout manipulations or let you control the width of a field in a table. The toolbar offers a limited number of options, and they cannot be customized. Also, the program lacks a macro facility.

The logic bar chart (see screen 2) optimizes the drawing of links after every change, but the optimization process is so long that you have to abort it to bypass it most of the time. You have the option, of course, to turn off the dependency drawing, but then you do not get to use this power-

ful version of the bar chart.

While the other packages come with unlimited free technical support, CA-SuperProject's lasts for only 90 days. Further help costs \$2 per minute (with a minimum charge of \$20 per call), or you can purchase Computer Associates' Support Plus, which includes complete technical support and software updates, for a fee of \$195 a year.

Although the free technical support is minimal, you'll find the program's manuals complete, along with a comprehensive on-line context-sensitive help facility. In addition to the on-screen tutorial and table of contents, which most programs support, there are three layers of help, each designed for a different sensitivity. There is a continually available one-line help feature and a useful optional four-line ("Assist mode") help feature as well.

CA-SuperProject has about everything you can think of in terms of PM functionality and flexibility. But for the program to lure a wider range of users, Computer Associates needs to adhere to the common Windows interface.

**Time Line 1.0**

When PM software usability is your primary concern, you might want to turn to

the offerings from Symantec. This software developer currently offers two look-and-feel-alike programs intended for two distinct groups of users. Unlike its low-end sister program On Target (described below), the \$699 Time Line for Windows 1.0 (see screen 3) is for those who are already familiar with PM software techniques.

Time Line is built on its sister product and uses a great deal of its code, so the programs share some strengths and weaknesses. Both programs support remarkably powerful zooming capabilities, a task-outline structure that is graphically shown on a PERT chart, a Controlling Factors box that clarifies why a task is scheduled for completion by a certain date, use of phrases such as "this week" and "this month" rather than requiring you to set date ranges repeatedly, a useful calendar report that prints a monthly wall calendar of the schedule, and a versatile print-preview function that shows the colors of the working views.

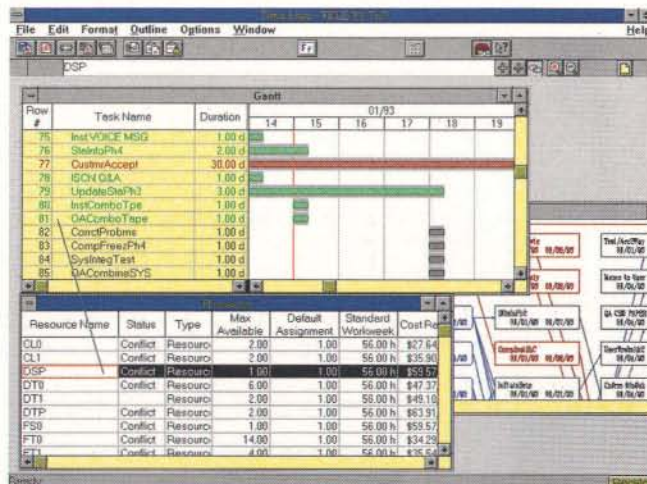
Yet the \$300 price difference between Time Line and On Target needs some justification. Perhaps it can be attributed to Time Line's added flexibility, better modeling of real-life projects, additional library views offering more analysis, improved system interface, and enhanced intelligence.

Time Line can handle larger projects—up to 8000 tasks—than On Target. You can set ALAP (as late as possible) tasks and fixed start and end dates, and you can set effort-driven (based on worker-hours input) tasks and link tasks in four ways (see table 1). You can view and print more than 180 fields, not just 50, as with On Target.

Time Line offers a set of cross-tabulation views and reports, breaking down every task into periodic cost or resource amounts. The program's toolbar is composed of more than 30 commonly used functions.

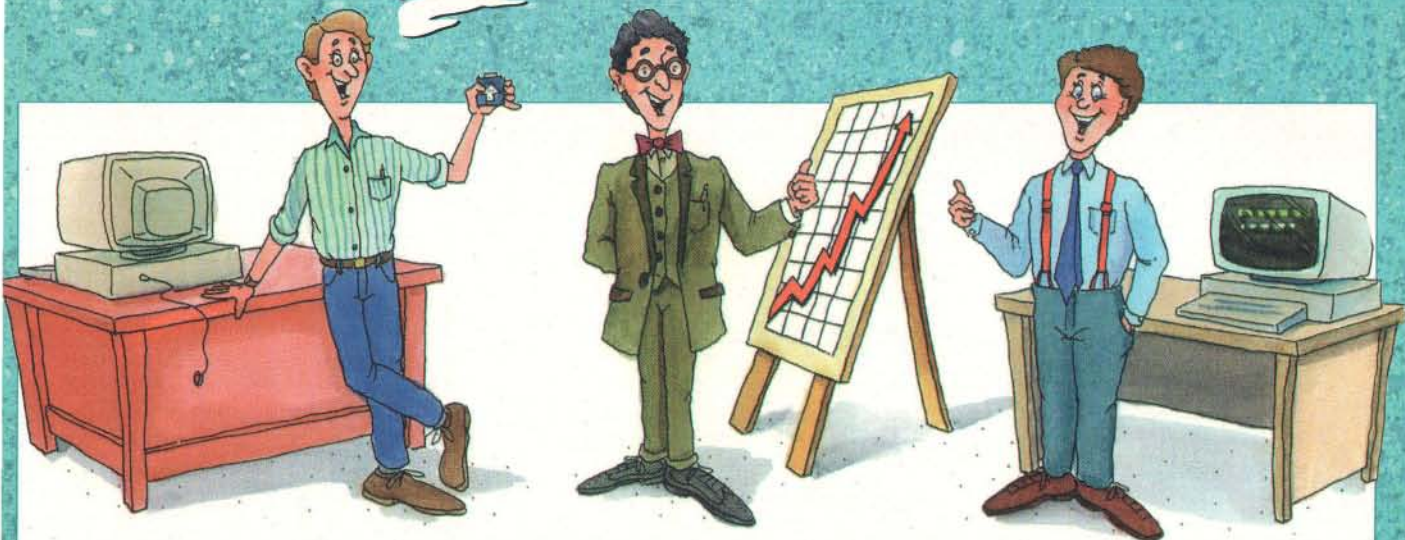
The program supports OLE, and Time Line makes it a simple matter to establish an OLE link with other programs and

**Screen 3:** Assigning resources to a task has never been easier and more intuitive: With Time Line, you just point to a resource and drag it to the appropriate task.





# WHY HARDLOCK IS THE PREFERRED *Network* PROTECTION SYSTEM



## Developers Say...

"Hardlock is Networking! Now everyone on the Network can access my application without having the Hardlock on their PC. NET Hardlock's interface allows me to easily limit the number of simultaneous users without having to build this up myself. Since NET Hardlock contains an algorithmic response ASIC, I'm assured of the highest level of protection. And Glenco's software interface choices couldn't have been easier to use!"

## Accountants Say...

"NET Hardlock is a welcome addition to the Hardlock family of revenue protection products. Now limiting and expanding the simultaneous user portion of the license agreement is the easy part! Our costs are lowered and the end user benefits - it's a perfect solution!"

## End Users Say...

"NET Hardlock is the easiest protection system I've ever used! Once the NET Hardlock is plugged in, I don't even know it's there. Now the application can find the NET Hardlock regardless of which PC I'm using. We can easily add more users to the license without shipping Hardlocks back and forth. Just knowing the software developer is paid for their efforts makes me feel confident that the next upgrade is coming and my investment is secure!"

### Other products in the Hardlock Family:

Hardlock & Hardlock with Memory (Single User)

Hardlock DES (Data Security)

Hardlock SE (Workstations)

Call for your 30-Day No Risk Evaluation Kit!

**Supporting Windows, DOS, OS/2, Unix**



Shown actual size.

The *only* product that combines a memory option with programmable, algorithmic response — all in one compact unit.

Made in the USA.

**GLENCO**  
ENGINEERING INC.  
SERVING THE SOFTWARE INDUSTRY SINCE 1979

**1-800-562-2543**

270 Lexington Drive Buffalo Grove, Illinois 60089-6930  
708/808-0300 Fax: 708/808-0313

For a distributor in Europe contact Fast Electronic GmbH, Tel: 49-89-538-800-0 Fax: 49-89-539-800-40

In Korea contact Finecom, Tel: 82-2-690-5811 Fax: 82-2-605-5729

In Brazil contact HT-MACH, Tel: 21-257-0314 Fax: 21-235-6808

In Chile contact Datasoft S.A., Tel: 562-246-7443 Fax: 562-208-0591

In Peru contact V.C.H.I., Tel: 51-14-440537 Fax: 51-14-475984

For International information circle 89, For End-User information circle 90 on Inquiry Card.

PROJECT MANAGEMENT SOFTWARE PERFORMANCE

**Table 2: Benchmark results.** All tests were conducted on a 200-task project. The Program Load test measures the time required to bring up a program; the File Load test measures the time needed to load the project; the Scheduling test measures the time it takes for a package to perform a complete recalculation of the project after a task duration has changed; and the Gantt Print test measures the time needed to print a Gantt chart of the entire project with a one-page-wide time scale. All times are in seconds except for the Gantt Print results, which are in minutes:seconds.

Product	Program Load	File Load	Scheduling	Gantt Print
CA-SuperProject 2.0a	5	4	2	2:11
Microsoft Project 3.0	5	1	1	2:32
On Target 1.0	1	3	3	2:11
Time Line 1.0	3	16	1	2:04

access the attached document. But this function froze my screen in several cases. A separate program is bundled with Time Line that enables you to quickly transfer your schedules from Microsoft Project. However, you will have to review the assumptions made by the vendor to overcome data-translation incompatibilities between the two programs.

Time Line's Co-Pilot facility is an extension of On Target's Schedule Assistant facility. It offers intelligent guesses based on user actions that may have more than one possible intent. It prompts you for all possibilities and gives you the opportunity to make an informed choice.

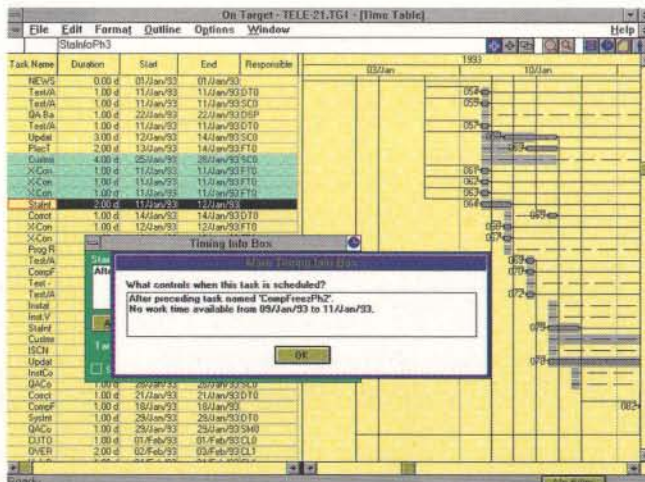
Multiproject scheduling is supported under one project file. Alternatively, you can establish task or summary task links across projects based on WBS (work breakdown structure) codes. But to find the right WBS code of a task in a different project, you have to launch an additional copy of Time Line and use it to view the other project. Furthermore, the nature of

the cross-file Consolidate function, which does not use the Windows DDE technique, does not permit links to automatically reflect changes made to the source projects (i.e., predecessor tasks). However, this multiproject scheduling may be handy where related projects are scheduled by different users who level their resources separately.

There are a few areas in which Time Line could be improved. The program supports hourly time units, but not time of day. You can embed objects from other applications in Time Line, but not vice versa. Multitask manipulations are good only for enhanced views or when you are posting tasks as being completed. The addition of a macro facility and the ability to customize the toolbar could improve the program's ease of use.

On the plus side, Time Line is based on a simple design and takes advantage of Windows 3.1's capabilities and interface. It delivers the most essential PM needs and requires little time to master.

**Screen 4:** If you need to know what controls a task when it is scheduled, On Target's More Timing Info box makes it easy to find out.



**On Target 1.0**

Have you ever read about or tried to use PM software and thought it was too technical, full of jargon, and hard to understand? Then you might want to give Symantec's On Target 1.0 (see screen 4) a try. This program is in a category of its own, not just because of its low \$399 price tag, but because it is aimed at those who want to begin managing projects on a PC but are not sure if they can.

On Target is simple to learn and easy to understand. It does not offer the flexibility or the number of toolbar functions of its higher-priced counterpart, but you can start with On Target and smoothly upgrade to Time Line whenever you want.

On Target looks and feels just like a genuine Windows application. In addition to providing the normal Windows-based PM software features, the program allows you to manually move any task in a list to another location by just dragging it. As you move or stretch a bar on a Gantt chart, a small box appears along with two vertical lines that represent the chart's duration.

The core of the program contains three main windows: Gantt chart, PERT chart, and resource list. You can open them simultaneously to build projects in an unusual and effective way: You can use a predefined Starter Schedule or design one with the help of the Schedule Assistant. If On Target senses a task that could be the predecessor of another task, it notifies you of this possibility. You also can establish links on an outline or a Gantt chart to a successor by pointing to a predecessor's name or bar and dragging the mouse to it. To add an assignment to a task, you simply draw a line between the task and the assignment.

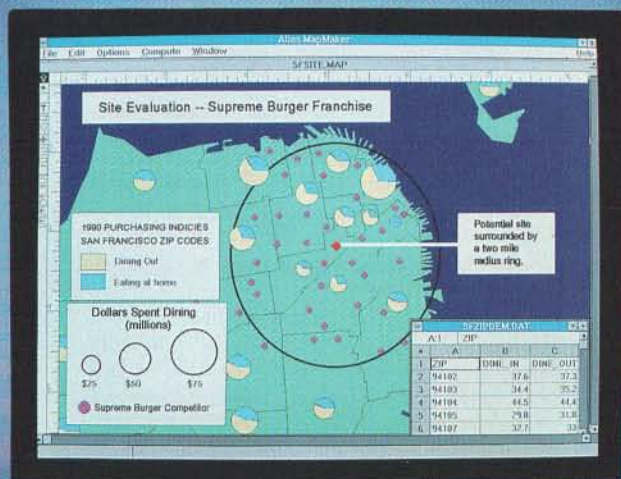
On Target is fully WYSIWYG: You can't print anything that you cannot view on the screen. Instead of a standard report list, it offers a set of standard screen-view libraries that you can load to screen, review, and print. Or you can save any of the views you design to your own libraries for later use. To verify that your report will print the way you want, you can preview it on-screen. You can also preview the report or chart with one page zoomed at a time and then go back to the entire report view. You can review and edit headers, footers, and margins before getting a printout.

If you need to follow formalized PM techniques but feel intimidated by them or cannot afford to learn them, you might find On Target to be just the PM software package you need to manage your projects better and to communicate them more clearly.

*continued*

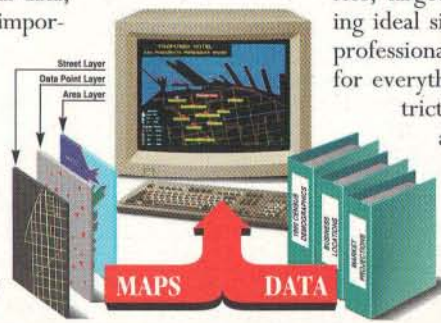
# ATLAS SOFTWARE

## A NEW DIMENSION IN DATA MANAGEMENT



**M**

Most business and government professionals view and analyze data with spreadsheets, databases and occasionally in business graphics packages. While these types of software work well when displaying statistical data, they are blind to important geographical information — such as market potential by sales territory, distribution coverage by product, or customer locations by ZIP code or street address.



And when we say important, we mean mission critical. For example, *Atlas Software* can help business professionals answer “what if” and “show me where” questions for optimizing sales territories, targeting customers, and selecting ideal site locations. Government professionals can use *Atlas Software* for everything from political redistricting to land-use planning and public safety analysis. Without *Atlas Software* decision makers often overlook important geographic information and allocate resources ineffectively.

base map and data sampler from our comprehensive library containing over 75 gigabytes of geographic files, business statistics and demographic data.



*Atlas Software* comes in a variety of “flavors” to suit your specific needs and supports MS DOS®, MS Windows® and Macintosh operating systems.

So if you're ready to add a dynamic new dimension to the way you use information, like 25,000 other Strategic Mapping customers, call us for a free *Desktop Mapping Guidebook* and demo disk. We'd be happy to map out a plan for you.

*Atlas Software™* is changing that. By linking data from spreadsheets, databases and even other applications — on your PC or Macintosh® — you can now add the important geographical dimension to your information system.

*Atlas Software* programs come equipped with built-in data management capabilities, map file importing and a generous

**Phone: (408) 970-9600**  
**FAX: (408) 970-9999**



- In Canada, call 416-693-4166
- In the UK, call 44-81-994-2780
- In Germany, call 49-228-62-73-82
- In Australia, call 61-3-866-1766
- In Belgium/LUX, call 32-2-771-25-75
- In the Netherlands, call 34-340-266-336
- In France, call 33-1-45-27-20-61
- In Denmark, call 45-42-25-17-77
- In Spain, call 34-1-564-1356
- In Brazil, call 5521-262-9459

Circle 125 on Inquiry Card.

**Which One for You?**

Significant benefits never come without some investment. To get the most from a PM software package, you first need to invest in an up-front effort to plan your projects correctly. Second, while your project is in progress, you have to be consistent in reporting back to your program how things are actually turning out. Your success will depend as much on how persistent you are with these two tasks as on how well the software tool you choose meets your expectations.

Even though they all run under Windows, these four programs feel and act different. Each has something special to offer. On Target does only simple planning, but it simplifies PM concepts and learning and costs almost half as much as the others. And if you purchase On Target and then need to handle larger projects or model them more accurately, you can upgrade to Time Line with ease. With Time Line, you must be more experienced and learn a little bit more, but you will get a better program with additional planning flexibility and more tools to make your work easier.

More demanding users can choose between CA-SuperProject and Microsoft

Project. CA-SuperProject has some rough interface edges and costs more than the other packages, but it delivers extensive modeling options and the highest PM power of the group.

If you can get along with somewhat less power, you may prefer Microsoft Project. It offers more sophistication because it uses Windows so effectively. It is the most customizable package of the group and accommodates tremendous presentation flexibility. An added bonus is that Project is also available on the Mac, so you may not need to make a choice between two environments.

Picking a clear winner from this group is a difficult task. The two programs that stand out are CA-SuperProject and Microsoft Project. If you need power, choose CA-SuperProject. If you must have ease of use and customization, choose Microsoft Project. ■

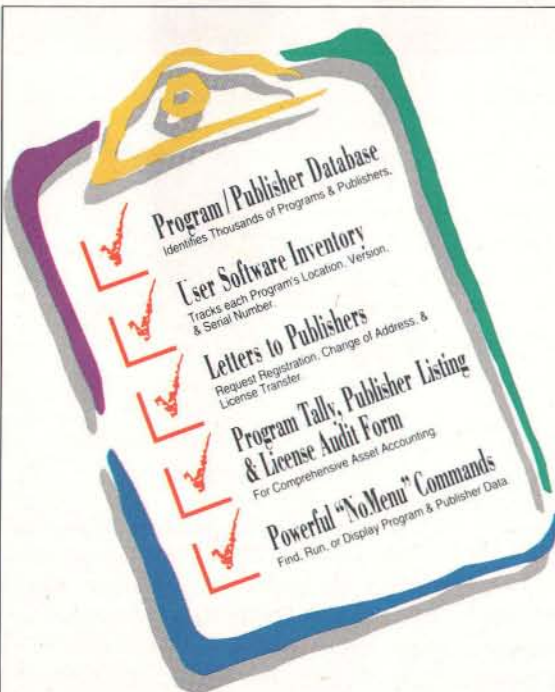
*Daniel Yahdav is a consultant based in San Rafael, California. His firm, I Soft Decision, Inc., specializes in corporate PM software selections and publishes several related studies. You can reach him on BIX clo "editors."*

**COMPANY INFORMATION**

**Computer Associates International, Inc.**  
 (CA-SuperProject for Windows 2.0a)  
 1 Computer Associates Plaza  
 Islandia, NY 11788  
 (800) 342-5224  
 (516) 342-6000  
 fax: (516) 342-5329  
**Circle 1060 on Inquiry Card.**

**Microsoft Corp.**  
 (Microsoft Project for Windows 3.0)  
 1 Microsoft Way  
 Redmond, WA 98052  
 (800) 426-9400  
 (206) 882-8080  
 fax: (206) 936-7329  
**Circle 1061 on Inquiry Card.**

**Symantec Corp.**  
 (On Target 1.0, Time Line for Windows 1.0)  
 10201 Torre Ave.  
 Cupertino, CA 95014  
 (408) 253-9600  
 fax: (408) 253-4092  
**Circle 1062 on Inquiry Card.**



# Your Software. What's It Worth to You?

Over time, you may spend more on software than you do on hardware. Keeping track of your programs, compatibility, new versions, and serial numbers can become a time-consuming task. But if you don't, you may lose your eligibility for upgrades, technical support, and other benefits.

Check✓List, the new Software Management And Registration Tracking system is the SMART way to protect your valuable investment in software. Check✓List works automatically to identify the programs installed on any disk drive, remember their location, and even write letters to the publishers updating the registration data.

- Searches any Disk Drive to Create Inventory Database
- Identifies Over 5,000 ProgramTitles and Publishers Automatically
- Includes Publisher's Addresses and Phone Numbers
- Finds "Unknown" Programs
- Determines Exact Program Version
- Users can Add, Delete, or Edit Programs and Publishers

- Stores Serial Numbers
- Exports Inventory Data to Other Programs
- Five Standard Report Types and Three Letters
- FREE Update of Master Library Included with Registration

Once you start using Check✓List, you will never waste time searching for a "lost" program, wondering what revision you're using, or finding technical support numbers. As an added bonus, the "NoMenu" command makes it easy for DOS users to automatically access any program without knowing the directory!

So get the SMART approach to software licensing and save time, money and hassles on software updates, upgrades, and volume purchases.

**CHECK✓LIST™**  
 SOFTWARE MANAGEMENT & REGISTRATION TRACKING SYSTEM

**TouchStone**  
 Software Corporation  
 2130 Main Street, Suite 250  
 Huntington Beach, CA 92648  
 (800) 531-0450 or (714) 969-7746



# Your Direct

# Link to Products

**BYTE introduces Your Direct Link – An enhanced service for BYTE readers that gives you free information on products – faster and easier!**

In the NEW Direct Link section, here's what you'll find:

**Alphabetical Index to Advertisers Including Phone Numbers**

Now dial companies directly.



**Product Category Index to Advertisers**

Order information on individual products or complete product categories.

**Redesigned Editorial Index**

Free information from companies covered in articles, columns, or news stories.

**New Enhanced Direct Link Card**

Receive free information quickly by filling out and mailing or faxing *Your Direct Link Card* today!



Send for FREE product information by filling out *Your Direct Link Card* found in the back of every issue.

**Buy It Through BYTE!**

**BYTE**

# 128 BYTE's Guide to Top Windows Products

COMPILED BY JAN FIDERIO

If you're considering buying Windows software, you'll find over 3000 products on the market, and that number is growing every day. One way to decide on your needs is to look at what other people are buying. To help you in your search, BYTE has compiled a list of 128 of the hottest Windows products. We started with our own surveys of what BYTE readers are buying and with a list of Windows best-sellers from software distributor Ingram Micro. Finally, we added a few new products that we anticipate will be big sellers, such as Quattro Pro for Windows 1.0 and AutoCAD release 11 Extension for Windows.

You'll find products listed alphabetically by category,

as well as listings ranging from programming tools to entertainment, and word processors to CAD. Each product listing includes a short description, company information, pricing, and (when available) a reference to the most recent BYTE review. We've also flagged those products that support OLE or DDE for sharing data with other programs. And so you know what to ask for, we've included each product's introduction and latest release date.

This list certainly isn't comprehensive, but it's a good place to start if you're in the market for Windows software. Before making a purchase, be sure to refer back to BYTE reviews for evaluations of similar products not included here.



**KnowledgePro Windows 2.11,**  
Knowledge Garden

## APPLICATIONS GENERATORS

### Actor 4.1, \$249

*Introduced: Feb. 1987*  
*Latest release: Sept. 1992*  
*Supports DDE and OLE*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 999-8846  
(415) 968-4892  
fax: (415) 968-4622

**Circle 976 on Inquiry Card.**

**A**ctor 4.1 is an object-oriented visual-programming environment, with which you can use graphics, windows, and data management tools for rapid development of custom Windows

applications. The software features a reusable toolkit of objects that includes edit windows, graphics, and dialog boxes.

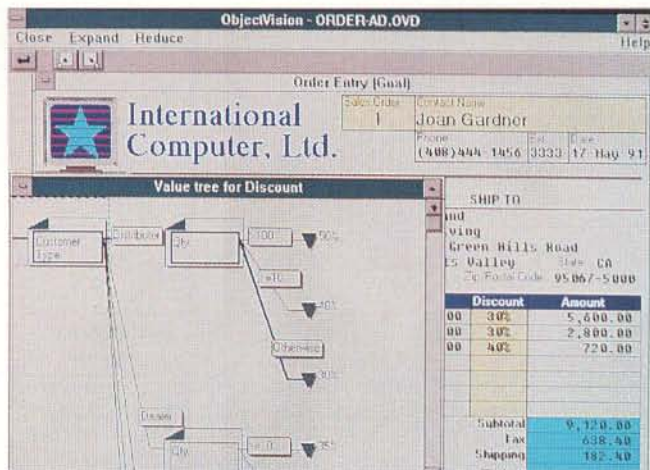
### KnowledgePro Windows 2.11, \$549

*Introduced: May 1990*  
*Latest release: April 1992*  
*Supports DDE*

Knowledge Garden, Inc.  
12-8 Technology Dr.  
Setauket, NY 11733  
(516) 246-5400  
fax: (516) 246-5452

**Circle 977 on Inquiry Card.**

**K**nowledgePro Windows 2.11 combines visual-programming tools with an object-oriented environment for developing Windows applications. The software provides more than 300 commands, interactive design tools, simplified access to DDLs, and enhanced bit-map performance. KnowledgePro Windows lets you select fonts, colors, and styles, as well as drag, size, and drop screen objects, text, and graphics images, and link them to other objects.



**ObjectVision 2.0, Borland International**



**CADvance 5.0 for Windows, IsiCAD**

### Multimedia Resource Kit, \$300

*Introduced: March 1991  
Supports DDE*

Asymetrix Corp.  
110 110th Ave. NE, Suite 700  
Bellevue, WA 98004  
(206) 462-0501  
fax: (206) 455-3071  
**Circle 978 on Inquiry Card.**

**T**he Multimedia ToolBook 1.5 includes the Multimedia Resource Kit and ToolBook 1.5. The package lets you link to and control multimedia hardware and software that has a Windows DLL or a driver that is compatible with the Windows Multimedia Extensions.

### ObjectVision 2.0, \$149.95

*Introduced: Feb. 1991  
Latest release: Nov. 1991  
Supports DDE and OLE*

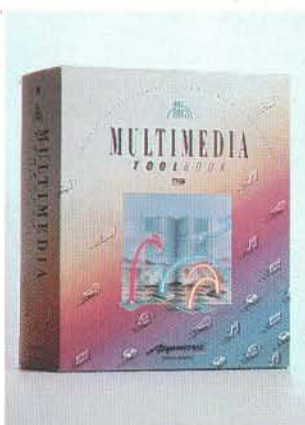
Borland International, Inc.  
1800 Green Hills Rd.  
Scotts Valley, CA 95067  
(800) 331-0877  
(408) 438-8400  
fax: (408) 439-9119  
**Circle 980 on Inquiry Card.**

**A** visual applications development tool, ObjectVision 2.0 lets you create Windows applications by pointing and clicking. You simply draw the interface, add logic, and then make the connections to your data. The software includes graphical decision-tree logic; DLL, DDE, and OLE support; direct access to Paradox, dBase, Btrieve, and ASCII data; and Borland's Menu-on-Demand menu builder.

### Multimedia ToolBook 1.5, \$695

*Introduced: Sept. 1991  
Supports DDE*

Asymetrix Corp.  
110 110th Ave. NE, Suite 700  
Bellevue, WA 98004  
(206) 462-0501  
fax: (206) 455-3071  
**Circle 979 on Inquiry Card.**



**Multimedia ToolBook 1.5, Asymetrix**

### ToolBook 1.5, \$395

*Introduced: May 1990  
Latest release: April 1991  
Supports DDE*

Asymetrix Corp.  
110 110th Ave. NE, Suite 700  
Bellevue, WA 98004  
(206) 462-0501  
fax: (206) 455-3071  
**Circle 981 on Inquiry Card.**

**T**oolBook 1.5 lets you create custom Windows applications without using traditional programming methods. The object-oriented, visual applications development package supports large bit maps, DLL, DDE, and file locking. ToolBook also provides application examples, sample scripts, and graphics filters that let you import DRW, EPS, TIFF, BMP, DIB, CGM, and WMF files. (See "Script Languages: The BASIC of the 1990s?" April 1991 BYTE.)

### CAD

### AutoCAD release 11 Extension for Windows, \$99 AutoCAD release 11, \$3500

*Introduced: March 1992  
Supports DDE*

Autodesk, Inc.  
2320 Marinship Way  
Sausalito, CA 94965  
(800) 445-5415  
(415) 332-2344  
fax: (707) 794-1325  
**Circle 982 on Inquiry Card.**

**T**he Windows Extension for AutoCAD release 11 adds a toolbar, dialog boxes, and support for bidirectional DDE links. You use the Clipboard to copy AutoCAD drawings into Windows-based applications, such as word processing and desktop publishing programs.

## COMMUNICATIONS

**CADvance 5.0 for Windows, \$1995**

Introduced: Jan. 1992  
 Latest release: Aug. 1992  
 Supports DDE and OLE

IsiCAD, Inc.  
 1920 West Corporate Way  
 Anaheim, CA 92803  
 (800) 634-1223  
 (714) 533-8910  
 fax: (714) 533-8642

**Circle 983 on Inquiry Card.**

**C**ADvance 5.0 for Windows lets you exchange drawing data bidirectionally via the Clipboard or by setting up DDE or OLE links. The package supports the Multiple Document Interface protocol for multiple views of drawings and raster and vector data in the same drawing. The Visual Programming Tool records activities like drawing functions and generates compilable code for customizing CADvance. The software complies with IBM's SAA/CUA (Systems Application Architecture/Common User Access) specifications.

**Drafix Windows CAD 2.0, \$695**

Introduced: Oct. 1989  
 Latest release: Feb. 1992  
 Supports DDE

Foresight Resources Corp.  
 10725 Ambassador Dr.  
 Kansas City, MO 64153  
 (800) 231-8574  
 (816) 891-1040  
 fax: (816) 891-8018

**Circle 984 on Inquiry Card.**

**D**rafix Windows CAD 2.0 features icons, user-definable buttons, a CAD edit bar, cascading menus, about 50 new shortcut keys, associative dimensioning, and a macro programming language. The Multiple Viewport feature lets you work in up to four views concurrently. Foresight Resources offers optional symbol libraries, a report generator, an extended memory manager, and overlays.

**cc:Mail for Windows 1.1, \$345 (10-user pack)**

Introduced: May 1991  
 Latest release: May 1992  
 Supports DDE

cc:Mail, Inc.  
 A Division of Lotus Development Corp.  
 2141 Landings Dr.  
 Mountain View, CA 94043  
 (800) 343-5414  
 (415) 961-8800  
 fax: (415) 960-0840

**Circle 985 on Inquiry Card.**

**C**c:Mail for Windows 1.1 offers everything you need to set up a Windows-based E-mail system, including administrator and client software. The package supports text, graphics, binary, and fax file attachments and runs on most LANs, including NetWare LAN Manager, AppleTalk, OS/2 Lan Server, and Vines. Other features include a spelling checker, an applications launcher, and keyword text searches. (See "Please, Mister Postman," March 1991 BYTE.)

**Crosstalk for Windows 1.2.2, \$195**

Introduced: July 1989  
 Latest release: May 1992  
 Supports DDE

Digital Communications Associates, Inc.  
 1000 Alderman Dr.  
 Alpharetta, GA 30202  
 (800) 348-3221  
 (404) 442-4000  
 fax: (404) 442-4366

**Circle 986 on Inquiry Card.**

**C**rosstalk for Windows 1.2.2 lets you create Program Manager icons that provide instant access to commonly used information services. In addition, the telecommunications software includes a script language, cut-and-paste capabilities from the Windows notepad into a communications session, and support for COM1 through COM4. Crosstalk for Windows supports eight file-transfer protocols, including ZMODEM, and seven terminal-emulation modes.

**DynaComm Asynchronous 3.1, \$249**

Introduced: May 1990  
 Latest release: July 1992  
 Supports DDE

FutureSoft, Inc.  
 1001 South Dairy Ashford,  
 Suite 101  
 Houston, TX 77077  
 (713) 496-9400  
 fax: (713) 496-1090

**Circle 987 on Inquiry Card.**

**Procomm Plus for Windows 1.0, Datastorm Technologies**

**T**he DynaComm Asynchronous 3.1 telecommunications program includes INT14 support for network connectivity, a viewer for GIF and REGIS (remote graphics instruction set) files, VT340 terminal emulation, and a scripting language. It supports seven file-transfer protocols, including ZMODEM, and NCSI, NASI, TCP/IP, and DEC Pathworks 4.0 network interfaces. A dialing directory includes log-ins for more than 200 BBSes. (See "A Few of Our Favorite Things," June BYTE.)

**FaxGrabber 1.0, \$149**

Introduced: Oct. 1991  
 Supports DDE

Calera Recognition Systems, Inc.  
 475 Potrero Ave.  
 Sunnyvale, CA 94086  
 (800) 544-7051  
 (408) 720-8300  
 fax: (408) 720-1330

**Circle 988 on Inquiry Card.**

**A** background fax-conversion utility, FaxGrabber 1.0 translates incoming fax images into ASCII text. FaxGrabber lets you preview files and cut portions for conversion, or it can translate them automatically. You can save translated files in more than 50 word processing, spreadsheet, and desktop publishing formats. FaxGrabber supports most CAS (Communications Applications Specification)-compatible fax boards.

**Irma Workstation 2.0, \$495**

Introduced: May 1990  
 Latest release: May 1992  
 Supports DDE

Digital Communications Associates, Inc.  
 1000 Alderman Dr.  
 Alpharetta, GA 30202  
 (800) 348-3221  
 (404) 442-4000  
 fax: (404) 442-4361

**Circle 989 on Inquiry Card.**



With the Irma Workstation 2.0, you can communicate as an IBM 3270 terminal with mainframe systems via CUT (Control Unit Terminal), DFT (discrete Fourier transform), SDLC (synchronous data-link control), or Token Ring, or as a NetBIOS client to an IrmaLAN gateway. The IBM 3270 communications software package supports all-points-addressable graphics and works with Digital Communications Associates and IBM 3270 communications adapters.

**Procomm Plus for Windows 1.0, \$149**

*Introduced: May 1992  
Supports DDE*

Datastorm Technologies, Inc.  
P.O. Box 1471  
Columbia, MO 65205  
(800) 326-4999  
(314) 443-3282  
fax: (314) 875-0595

**Circle 990 on Inquiry Card.**

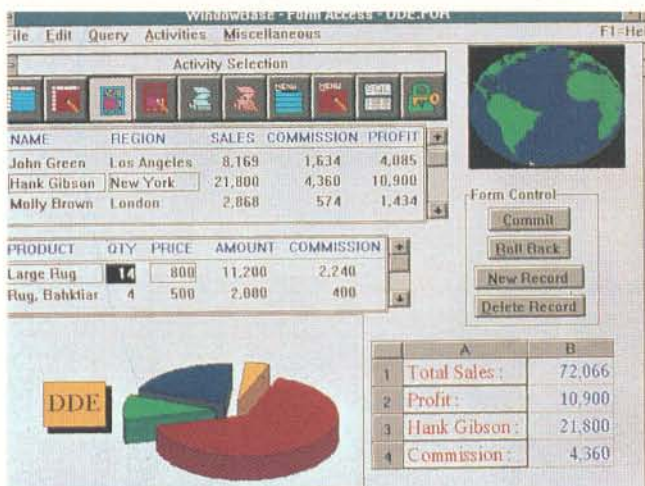
The Windows version 1.0 of Procomm Plus supports 34 terminal emulations; 11 file-transfer protocols, including ZMODEM; and INT14 for network use. A customizable action bar provides quick access to most features, which include an automated dialing directory, the Aspect scripting language, a graphical dialog-box editor, keyboard remapping, and a utility for dynamically viewing GIF files as you download them. (See "Buttoning Up Procomm Plus," June BYTE.)

**Relay Gold 5.0 for Windows, \$399**

*Introduced: July 1991  
Latest release: April 1992  
Supports DDE*

Microcom, Inc.  
500 River Ridge Dr.  
Norwood, MA 02062  
(800) 822-8224  
(617) 551-1000  
fax: (617) 551-1968

**Circle 991 on Inquiry Card.**



**WindowBase 1.5, Software Products International**

Relay Gold 5.0 for Windows supports up to 15 simultaneous sessions and lets you cut and paste from the Windows Clipboard to a session. The package features 10 programmable Quick Buttons; the Hot Spots mouse interface; automated scripting; NASI and INT14 interfaces; 12 file-transfer protocols, including ZMODEM; and support for microcomputer-to-mainframe communications.

**WinFax Pro 2.0, \$119**

*Introduced: July 1991  
Supports DDE*

Delrina Technology, Inc.  
6830 Via Del Oro, Suite 240  
San Jose, CA 95119  
(800) 268-6082  
(408) 363-2345  
fax: (408) 363-2340

**Circle 992 on Inquiry Card.**

WinFax Pro 2.0 lets you send and receive faxes from within Windows applications by selecting the print function. Incoming faxes arrive in the background and beep when they are done. You can automatically print incoming faxes, as well as view, rotate, cut and paste, and zoom in on an image. Other features are broadcast, Group 3 fax support, conversion to PCX or TIFF, and an automated scheduler that lets you send faxes when phone rates are low.

**DATABASES**

**Approach 1.0 for Windows, \$399**

*Introduced: March 1992  
Supports OLE*

Approach Software Corp.  
311 Penobscot Dr.  
Redwood City, CA 94063  
(800) 277-7622  
(415) 306-7890  
fax: (415) 368-5182

**Circle 993 on Inquiry Card.**

Approach 1.0 for Windows is an easy-to-use, stand-alone relational database program with a point-and-click interface that lets you quickly build your database. The package includes a forms generator, a report writer, a mailing-label generator, and PowerKeys, a set of Windows DLLs that let you open and update files in dBase, Oracle SQL, and Paradox format. Approach can also function as an SQL (Structured Query Language) front end. (See "A Fresh Approach to Databases," August BYTE.)

**CA-dBFast 1.7, \$550**

*Introduced: July 1988  
Latest release: March 1992  
Supports DDE*

Computer Associates International, Inc.  
1 Computer Associates Plaza  
Islandia, NY 11788

(800) 342-5224  
(516) 342-6000  
fax: (516) 342-5329

**Circle 994 on Inquiry Card.**

A stand-alone system, CA-dBFast 1.7 lets you use your knowledge of dBase-compatible languages (e.g., dBase and Clipper) and run dBase III Plus applications concurrently with dBFast applications. The package includes an applications development language, a debugger that traps errors at source-code level, and support for modal and nonmodal paradigms and Windows DLLs.

**Paradox for Windows, \$795**

*Introduced: November 1992  
Supports DDE and OLE*

Borland International, Inc.  
1800 Green Hills Rd.  
Scotts Valley, CA 95067  
(800) 331-0877  
(408) 438-8400  
fax: (408) 439-9100

**Circle 995 on Inquiry Card.**

Paradox for Windows combines a relational database, applications development tools, and the InterBase local engine, which supports a variety of data formats and new data types with enhanced data security. Among the features are an object-oriented user interface, a Speedbar with object icons and action accelerators, Menus-on-Demand, layout and drawing tools, a graphical Query By Example function, and visual data modeling.

**SQLWindows 3.1, \$1595**

*Introduced: Aug. 1988  
Latest release: April 1992  
Supports DDE  
Add-on: Quest advanced querying and reporting tool, \$595*

Gupta Technologies, Inc.  
1060 Marsh Rd.  
Menlo Park, CA 94025  
(800) 876-3267  
(415) 321-9500

fax: (415) 321-5471  
**Circle 996 on Inquiry Card.**

**W**ith SQLWindows 3.1, you can create Windows database applications without resorting to C or the Microsoft Windows Software Development Kit. This object-oriented database applications development system features the SQL Windows applications language; the Express Windows applications generator; the Report Windows report writer; the single-user version of SQLBase Server; SQLTalk interactive data management, character mode, the SQL API, and a C API.

**Superbase 4 1.3, \$695**

*Introduced: Nov. 1989  
 Latest release: Sept. 1991*

**Superbase 2 1.3, \$345**

*Introduced: May 1989  
 Latest release: Sept. 1991  
 Supports DDE  
 Add-on: The Superbase SQL Library*

Software Publishing Corp.  
 3165 Kifer Rd.  
 Santa Clara, CA 95051  
 (408) 986-8000  
**Circle 997 on Inquiry Card.**

**A** relational DBMS, Superbase 4 1.3 includes image-handling and applications development tools, a forms designer, embedded SQL (Structured Query Language), macros, a communications program, and a Browser with a control-button interface. The system supports DDLs and GIF and TGA files.

Superbase 2 1.3 is a non-programmable subset of Superbase 4 1.3 that can act as a run-time system for Superbase 4 1.3 applications. The package comes with a forms design tool, a text editor, and a telecommunications utility. (See "DOS Databases at Work," January BYTE.)

**WindowBase 1.5, \$495**

*Introduced: Aug. 1991  
 Latest release: March 1992  
 Supports DDE*

Software Products International, Inc.  
 9920 Pacific Heights Blvd.  
 San Diego, CA 92121  
 (800) 937-4774  
 (619) 450-1526  
 fax: (619) 450-1921  
**Circle 998 on Inquiry Card.**

**W**indowBase 1.5 lets you input, view, and update data through forms, reports, or tables. The relational DBMS supports SQL (Structured Query Language) and includes features such as default forms and reports for fast design

work, a Data Viewer function for finding data quickly, and a point-and-select query system for making ad hoc reports. The package can accommodate dBase III and Btrieve files. (See "DOS Databases at Work," January BYTE.)

**DESKTOP PUBLISHING**

**Aldus PageMaker 4.0, \$795**

*Introduced: Jan. 1987  
 Latest release: April 1991  
 Supports DDE*

Aldus Corp.  
 411 First Ave. S  
 Seattle, WA 98104  
 (800) 685-3540  
 (206) 622-5500  
 fax: (206) 343-3360  
**Circle 999 on Inquiry Card.**

**A** standard in high-end desktop publishing, Aldus PageMaker 4.0 integrates text and graphics that let you produce sophisticated, professional-quality publications. The software includes professional typographic controls, style sheets, more than 35 predesigned templates, over 40 import and export filters, graphics and color controls, a table editor, long document capability, and a built-in word processor with a spelling checker. (See "FrameMaker: Power Publishing for Windows," October BYTE.)

**Express Publisher for Windows, \$149.95**

*Introduced: March 1992  
 Supports DDE*

Power Up Software Corp.  
 2929 Campus Dr.  
 San Mateo, CA 94403  
 (800) 851-2917  
 (415) 345-5900  
 fax: (415) 349-1356  
**Circle 1111 on Inquiry Card.**

**D**esigned for business users, Express Publisher for Windows is an easy-to-use document de-

sign and layout program that comes with 100 graphics images, Adobe Type Manager, 15 predesigned document templates and styles, and support for editable thumbnail views. You can rotate text and graphics, use automatic alignment and resizing tools, and zoom in on any part of the page. Express Publisher includes Text-Appeal text-effects software. (See "FrameMaker: Power Publishing for Windows," October BYTE.)

**FrameMaker 3.0 for Windows, \$795**

*Introduced: Jan. 1992  
 Supports OLE  
 Add-on: FrameReader*

Frame Technology Corp.  
 1010 Rincon Cir.  
 San Jose, CA 95131  
 (408) 433-3311  
 fax: (408) 433-1928  
**Circle 1112 on Inquiry Card.**

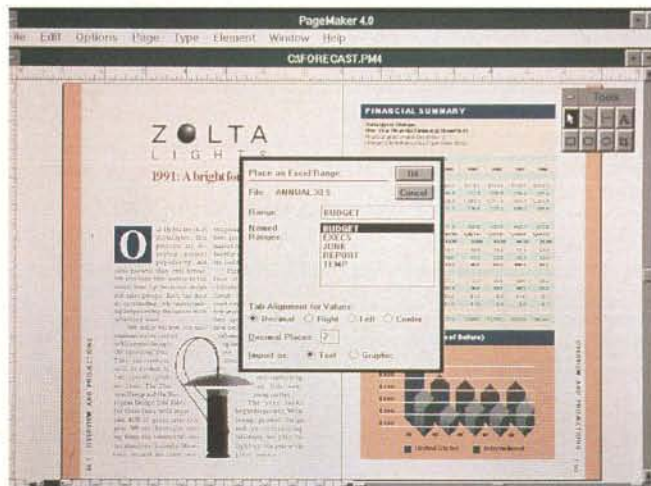
**P**reviously available for Unix and Mac systems, the Windows version 3.0 of FrameMaker combines WYSIWYG word processing, page layout, and structured document building into one application. The publishing package features conditional text, intelligent tables, long document capability, a wide selection of fonts, and electronic distribution and pagination capabilities. FrameMaker for Windows supports the Multiple Document Interface and lets you launch other applications from within the FrameMaker program.

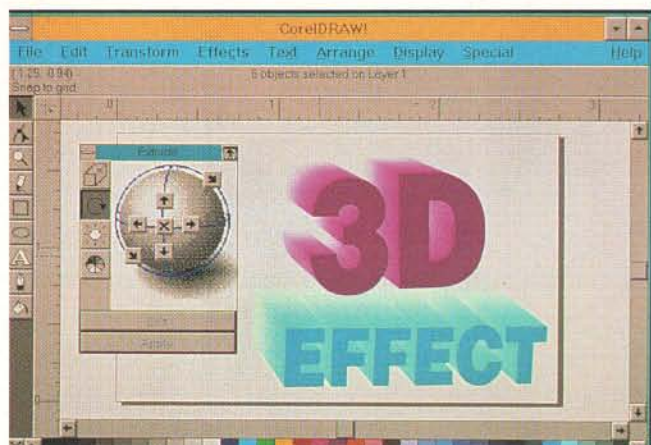
**Publisher for Windows 1.0, \$199**

*Introduced: Sept. 1991  
 Supports DDE and OLE*

Microsoft Corp.  
 1 Microsoft Way  
 Redmond, WA 98052  
 (800) 426-9400  
 (206) 882-8080  
 fax: (206) 936-7329  
**Circle 1113 on Inquiry Card.**

**PageMaker 4.0, Aldus**





**CorelDraw 3.0, Corel Systems**

An entry-level desktop publishing program, Publisher for Windows 1.0 includes The Page Wizard, which walks you through the creation of 12 types of publications, building the publication as you respond to questions. Key features include a word processor, a 120,000-word spelling checker, 100 clip-art images, border art, font effects, a search-and-replace command, and options for creating, placing, moving, and formatting text. (See "Frame-Maker: Power Publishing for Windows," October BYTE.)

**Ventura Publisher 4.0 for Windows, \$795**

*Introduced: Nov. 1991  
Latest release: Jan. 1992  
Supports DDE and OLE  
Add-ons: Ventura Separator, Ventura Color Pro, Ventura Scan, and Ventura DataBase Publisher*

Ventura Software, Inc.  
15175 Innovation Dr.  
San Diego, CA 92128  
(800) 822-8221  
(619) 673-0172  
fax: (619) 673-7672

**Circle 1114 on Inquiry Card.**

Ventura Publisher 4.0 for Windows is a high-end publishing package that features a spelling checker, undo/redo, and search and replace on text, attributes,

and tags. The software supports 24-bit true color and CMYK, CMY, RGB, HLS, and Pantone solid- and process-color models. Ventura Publisher can define 65,000 colors, of which 255 can be spot colors, and it supports TIFF, DCS, PCX, and EPS formats in 24-bit mode.

**DEVELOPMENT TOOLS**

**Microsoft Windows SDK for Windows 3.1, \$349**

*Introduced: March 1988  
Latest release: April 1992  
Supports DDE and OLE*

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329

**Circle 1115 on Inquiry Card.**

The Microsoft Windows SDK (Software Development Kit) provides OLE and DDE management libraries for adding DDE and OLE client and server support to your Windows applications. Three new features include Stress, a stress-testing tool; Dr. Watson for troubleshooting; and a Windows debugger. The SDK also has the tools that let you take advantage of Windows' multimedia and pen-computing extensions.

**DRAWING / PAINTING / IMAGING**

**Adobe Illustrator 4.0, \$695**

*Introduced: Jan. 1992  
Add-ons: Adobe Type Manager, Adobe Streamline, Adobe TypeAlign, and Adobe Type Library*

Adobe Systems, Inc.  
1585 Charleston Rd.  
Mountain View, CA 94043  
(800) 833-6687  
(415) 961-4400  
fax: (415) 961-3769

**Circle 1116 on Inquiry Card.**

"Art for Business's Sake," April BYTE.)

**Arts & Letters Graphics Editor 3.11, \$695**

*Introduced: Nov. 1988  
Latest release: Jan. 1992*

Computer Support Corp.  
15926 Midway Rd.  
Dallas, TX 75244  
(214) 661-8960  
fax: (214) 661-5429

**Circle 1118 on Inquiry Card.**

A long-time standard for Mac users, Adobe Illustrator 4.0 offers Windows users its combination of illustration and single-page design capabilities. The professional design-tool package supports 16- and 24-bit color and includes Adobe Type Manager, 40 Adobe Type 1 scalable fonts, Adobe TypeAlign, Adobe Separator, a toolbox, and a library of predrawn artwork. You can edit and refine color or black-and-white images on-screen in preview mode. (See "A New Illustrator for Windows," September BYTE.)

Arts & Letters Graphics Editor 3.11 is a high-end drawing and editing program that lets you specify size, position, length, angle, slant, and rotation of technical illustrations. Editing features include shape blending, hole cutting, clipping masks, EPS (Encapsulated PostScript) import conversion, autotrace, text along a path, and automatic four-color separations. The package includes more than 7000 clip-art images and 90 outline typefaces.

**CorelDraw 3.0, \$595**

*Introduced: Jan. 1989  
Latest release: June 1992  
Supports DDE and OLE  
Add-on: FontMonger*

Corel Systems Corp.  
The Corel Building  
1600 Carling Ave.  
Ottawa, Ontario,  
Canada K1Z 8R7  
(800) 836-3729  
(613) 728-8200  
fax: (613) 728-9790

**Circle 1119 on Inquiry Card.**

**Aldus FreeHand 3.1, \$595**

*Introduced: Dec. 1991  
Latest release: March 1992*

Aldus Corp.  
411 First Ave. S  
Seattle, WA 98104  
(800) 685-3540  
(206) 622-5500  
fax: (206) 343-4240

**Circle 1117 on Inquiry Card.**

Aldus FreeHand 3.1 lets you create black-and-white and true-color graphics. The package combines pressure-sensitive drawing tools, editing in full-screen color preview mode, color blending and separation capabilities, and a range of import formats. Text-handling features include editable font outlines, kerning, and text wrapping around objects. (See

A vector-based drawing tool, CorelDraw 3.0 lets you construct an image as a wireframe. The package includes drawing, charting, image editing, tracing, painting, and presentation graphics modules, as well as 14,000 clip-art images, 250



**Don't spend your time  
looking for information...  
Spend your time using it!!**

With ZyINDEX, you can find information contained in any document collection on network or stand alone computers in just seconds. **Quick, precise, fun;** ZyINDEX can search word processing, database or graphics files in plain english. Many output features. Powerful search tools: Word or Phrase; Boolean; Proximity; Synonyms and more... Powerful InfoApps features: HyperLink; Notes; Cut & Paste; Print; Launch...put your information to work for you. ZyINDEX works with WordPerfect, Word for Windows, dBase, graphics and other file formats. Developers API Toolkit available.



Call 1-800-544-6339 for  
free demo or update info

**ZyLAB**  
Division of  
Information Dimensions, Inc.

100 Lexington Drive • Buffalo Grove, IL 60089  
Phone: (708) 459-8000 • Fax (708) 459-8054

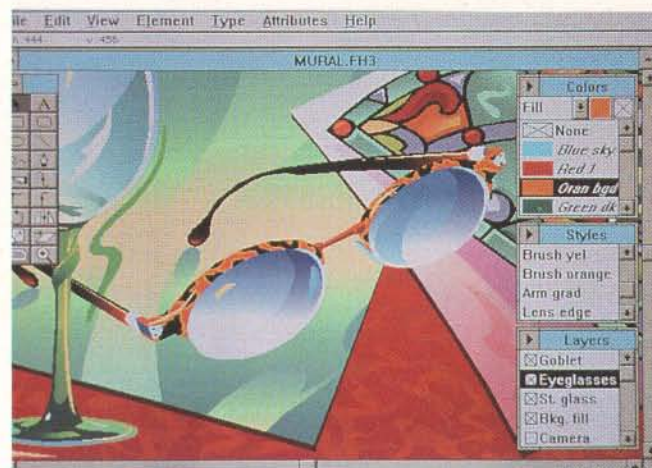
## A MESSAGE TO OUR SUBSCRIBERS

**F**ROM TIME TO TIME WE MAKE THE BYTE SUBSCRIBER list available to other companies who wish to send our subscribers material about their products. We take great care to screen these companies, choosing only those who are reputable, and whose products, services or information we feel would be of interest to you. Direct mail is an efficient medium for presenting the latest personal computer goods and services to our subscribers.

Many BYTE subscribers appreciate this controlled use of our mailing list, and look forward to finding information of interest to them in the mail. Used are our subscribers' names and addresses only (no other information we may have is ever given).

While we believe the distribution of this information is of benefit to our subscribers, we firmly respect the wishes of any subscriber who does not want to receive such promotional literature. Should you wish to restrict the use of your name, simply send your request to the following address.

**BYTE** Magazine  
Attn: Subscriber Service  
P.O. Box 555  
Hightstown, NJ 08520



**FreeHand 3.1, Aldus**

TrueType and Adobe Type 1 fonts, a visual file manager, and a tracing utility. Special effects include object extrusion and blending. (See "A Few of Our Favorite Things," June BYTE, and "CorelDraw 3.0: A Swiss Army Knife for Illustrators," October BYTE.)

### Fractal Design Painter 1.2 for Windows, \$399

*Introduced: March 1992*

Fractal Design Corp.  
335 Spreckels Dr., Suite F  
Aptos, CA 95003  
(408) 688-8800  
fax: (408) 688-8836

**Circle 1120 on Inquiry Card.**

**Y**ou can use Fractal Design Painter 1.2 for Windows, a 24-bit color paint program, to create original art or to add natural effects to other artwork and scanned images. The software simulates the tools and textures of natural media with features such as friskets, more than 50 variable paper textures, cloning, digital tracing paper, and multiple bristled brushes. You create with Fractal Design Painter's colored pencils, crayons, calligraphy pens, and charcoal. (See "A Few of Our Favorite Things, June BYTE, and "Art for Business's Sake," April BYTE.)

### Micrografx Designer 3.1, \$695

*Introduced: Jan. 1988  
Latest release: April 1992  
Supports OLE*

Micrografx, Inc.  
1303 Arapahoe Rd.  
Richardson, TX 75081  
(800) 733-3729  
(214) 234-1769  
fax: (214) 234-2410

**Circle 1121 on Inquiry Card.**

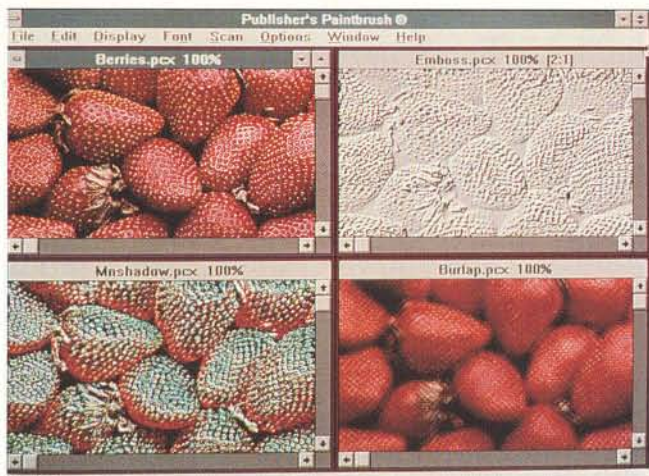
**U**sing Micrografx Designer 3.1, you can create presentations, illustrations, and brochures with 15 drawing tools, 64 layers, automatic dimensioning, object snap, and 2200 clip-art images. The illustration package supports TrueType fonts and includes Adobe Type Manager, Adobe Type Align, 30 import and export filters, and more than 175 Adobe Type 1 fonts. Designer lets you customize the toolbox, perform gradient fills, and select from the color palette. (See "Art for Business's Sake," April BYTE.)

### PhotoFinish 1.0, \$199

*Introduced: Dec. 1991*

ZSoft Corp.  
450 Franklin Rd., Suite 100  
Marietta, GA 30067  
(800) 444-4780  
(404) 428-0008  
fax: (404) 427-1150

**Circle 1122 on Inquiry Card.**



**Publisher's Paintbrush 2.02, ZSoft**

Casual business users can use PhotoFinish 1.0 to edit and enhance scanned photos, drawings, or clip art for importing into drawing, presentation, page layout, and word processing packages. Among the features are automatic retouching, special-effects filters and tools, a stitching feature for joining multiple scans, and a poster capability for banners and signs. (See "Image Doctors" in this issue, and "A Few of Our Favorite Things," June BYTE.)

### **PhotoStyler 1.1a, \$795**

*Introduced: Oct. 1991  
Latest release: April 1992*

Aldus Corp.  
411 First Ave. S  
Seattle, WA 98104  
(800) 685-3540  
(206) 628-2320  
fax: (206) 343-4240

**Circle 1123 on Inquiry Card.**

PhotoStyler 1.1a lets you scan, enhance, modify, compose, retouch, and print true-color, black-and-white, and gray-scale images. You can input images from scanners and video and produce color separations. PhotoStyler's gamma

correction feature lets you calibrate RGB display colors. (See "Image Magic," June BYTE.)

### **Picture Publisher 3.1, \$495**

*Introduced: Jan. 1989  
Latest release: June 1992  
Supports OLE*

Micrografx, Inc.  
1303 Arapaho Rd.  
Richardson, TX 75081  
(800) 733-3729  
(214) 234-1769  
fax: (214) 234-2410  
**Circle 1124 on Inquiry Card.**

Picture Publisher 3.1 is a 24-bit, color image editor for retouching and enhancing scanned or photographic images. The package features an image browser, 50 textures and images, color-separation controls, editing tools, JPEG (Joint Photographic Experts Group) compression, image stitching, and more than 30 special effects and filters. Picture Publisher supports the TWAIN and Kodak Photo CD standards. (See "Image Doctors.")

# BLAZING COLORS

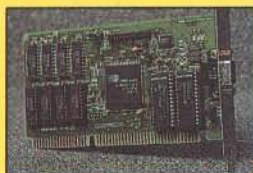
**Fast • True Color • Now Affordable**

With one of STB's new video boards, you can have accelerated True Color (up to 16.7 million vivid colors simultaneously) for the price of an "ordinary" Super-VGA 1-meg board! So why pay more for less?

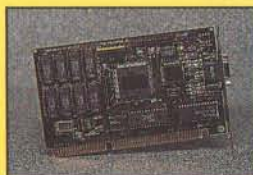
Whether you're a graphics, presentation or multimedia pro or a business application user, you'll appreciate the vivid colors and the real-world speed — on everything from popular DOS applications to GUIs — Windows, NT, OS-2, SCO ODT 2.0 — and CAD/CAM. Choose resolutions from VGA to 1280x1024 flicker-free non-interlaced.

View and manipulate photo-realistic images, see more spreadsheet text and scroll faster in DOS, or fly in Windows. STB's new True-Color trio takes you to a new level of performance. Easy, switchless installation will get you up and running fast, too. The 16-bit cards are fully VESA compatible; ISA, MCA and VL bus versions will be available. BIOS and video drivers are engineered by STB for maximum performance.

## Evolution

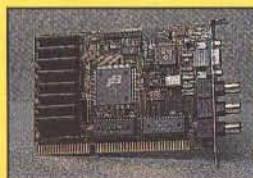


is a real value. A powerful hardware cursor, zero wait-state controller, high-speed memory architecture and optimized drivers accelerate you through your work at a Super-VGA price.



## PowerGraph X-24

is a full-featured graphics accelerator, with cost-effective DRAM memory, non-interlaced 1280 resolution and the fastest Windows drivers in its class.



## WIND/X Pro

delivers the maximum in performance with high-speed VRAM memory, 1280x1024 non-interlaced resolution and supports high-end RGB displays with the cleanest, sharpest display available.

To increase your computing productivity, ride one of these new entries into the exciting world of accelerated 24-bit color! You'll see why STB has earned price/performance leadership in expansion adapters...since 1981! And your bottom line will notice the affordable prices. Call today for more information.

U.S.: (214) 234-8750 • Europe: 0344-874744 (UK)

*Simply The Best*



**STB Systems, Inc.**

**Publisher's Paintbrush 2.02, \$495**

*Introduced: May 1991  
Latest release: May 1992*

ZSoft Corp.  
450 Franklin Rd., Suite 100  
Marietta, GA 30067  
(800) 444-4780  
(404) 428-0008  
fax: (404) 427-1150

**Circle 1125 on Inquiry Card.**

**P**ublisher's Paintbrush 2.02 works with gray-scale or color images and a long list of scanners. You can create original artwork, retouch or apply special effects to scanned images, add high-quality type to images, and reduce images to icons. The painting and image-editing software package provides 42 drawing tools, 24-bit photo-realistic image processing with 256 shades of gray and up to 16.8 million colors, and support for the Multiple Document Interface. (See "Art for Business's Sake," April BYTE.)

**Windows Draw 3.0 Plus OLE, \$149.95**

*Introduced: Oct. 1991  
Latest release: May 1992  
Supports OLE*

Micrografix, Inc.  
1303 Arapaho Rd.  
Richardson, TX 75081  
(800) 733-3729  
(214) 234-1769  
fax: (214) 234-2410

**Circle 1126 on Inquiry Card.**

**W**indows Draw 3.0 Plus OLE features nine drawing tools, 2600 clip-art images, and special-effect tools for blending, gradient fills, rotating objects, and placing text on a curve. In addition, the package provides more than 30 import and export filters and 32 TrueType fonts. You can stretch, slant, and flip drawings; add patterns; mix colors; and zoom in or out on an image. (See "Art for Business's Sake," April BYTE.)

**ENTERTAINMENT**

**After Dark 2.0, \$49.95**

*Introduced: March 1991  
Latest release: March 1992*

Berkeley Systems, Inc.  
2095 Rose St.  
Berkeley CA 94709  
(800) 877-5535  
(510) 540-5535  
fax: (510) 540-5115

**Circle 1127 on Inquiry Card.**

**I**n addition to more than 40 screen displays, the After Dark 2.0 screen saver includes digitized sound, network password support, the WallZapper wallpaper option, and Multimode, which lets you combine displays on-screen. Screen-saver displays include Swan Lake, Hall of Mirrors, Nocturnes, Marbles, Aquatic Realm, and the famous Flying Toasters.

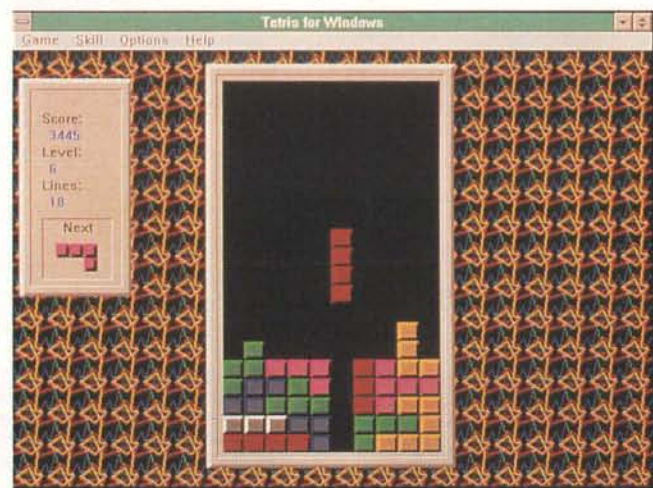
**Entertainment Pack Volumes 1-3, \$39.95 each**

*Introduced: May 1990  
Latest release: Sept. 1991*

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329

**Circle 1128 on Inquiry Card.**

**Entertainment Pack Volume 1, Microsoft**



**T**he Microsoft Entertainment Pack Volume 1 features seven games, including Tetris, Taipei, MineSweeper, TicTactics, Golf, Gruel solitaire, Pegged, and four screen savers. Volumes 2 and 3 each add seven more games to the collection. Titles include Pipe Dream, Free Cell solitaire, Rodent's Revenge, Tut's Tomb, JigSawed, Klotski, Fuji Golf, and several screen savers.

**The Far Side Computer Calendar 1.0, \$69.95**

*Introduced: Sept. 1991*

Amaze, Inc.  
11810 115th Ave. NE  
Kirkland, WA 98034  
(800) 367-4802  
(206) 820-7007  
fax: (206) 823-0568

**Circle 1129 on Inquiry Card.**

**T**he Far Side Computer Calendar 1.0 features a new Gary Larson cartoon each day and a few surprise animations. The calendar includes a daily planner with appointment alarm that presents day, week, month, or year views. The software can also handle recurring events. (See "A Few of Our Favorite Things," June BYTE.)

**Symantec Game Pack for Windows, \$39**

*Introduced: Oct. 1991*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
(408) 253-9600  
fax: (408) 253-4092

**Circle 1130 on Inquiry Card.**

**T**he six games in the Symantec Game Pack include Smart Dots, Pick Up Sticks, a version of the childhood game of Jacks, a Hangman word game, Memory Blocks, and Codebreaker.

**EXECUTIVE INFORMATION SYSTEMS**

**Forest and Trees 2.0d, \$495**

*Introduced: Dec. 1990  
Latest release: May 1992  
Supports DDE*

Channel Computing, Inc.  
53 Main St.  
Newmarket, NH 03857  
(800) 289-0053  
(603) 659-2832  
fax: (603) 659-7590

**Circle 1271 on Inquiry Card.**

**F**orest and Trees 2.0d is a group of data-access and reporting tools that let you collect, combine, and monitor business information. You start by creating a library of "vital signs" that keep tabs on your projects or those of your department or enterprise. Forest and Trees can access data in most spreadsheets, databases, database servers, and host databases. (See "EIS Moves to the Desktop," June BYTE.)

# THE ALTERNATIVE TO 60 DAYS OF HARD LABOR.



These days, you can spend far too much time investigating, gathering, digesting and organizing technical data. Which is why there's Datapro. We distill all the material you need to make smart decisions about information technology. Our reports, available in print and electronic formats, are timely. Thorough. Accurate. And objective. The last word on the subject. For a free sample report, call us today at 800-328-2776, Ext. 2777, or mail or fax this coupon. Unless you actually enjoy doing unnecessary work.

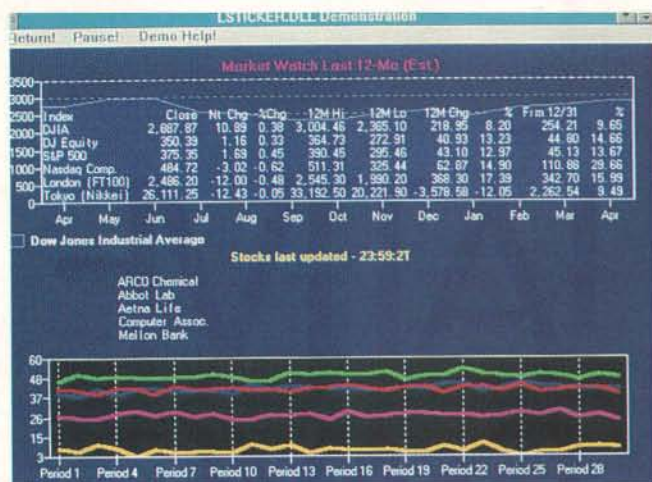
-----  
Name \_\_\_\_\_  
Title/Dept. \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone \_\_\_\_\_

**DATAPRO** *The last word.* 11

Datapro USA • 600 Delran Parkway, Delran, New Jersey USA 08075 • Tel: 609-764-0100 Fax: 609-764-2812  
Datapro International • McGraw-Hill House, Shoppenhangers Road, Maidenhead, Berkshire, England SL6 2QL • Tel: +44 (0) 628 773277 Fax: +44 (0) 628 773628

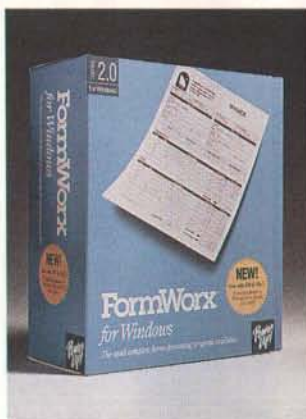
FREE sample report on workgroup computing.





Lightship 3.01, Pilot Software

FormWorx 2.01,  
Power Up Software



**FORMS SOFTWARE**

**FormWorx 2.01, \$299.95**

Introduced: April 1991  
Latest release: Jan. 1992

Power Up Software Corp.  
2929 Campus Dr.  
San Mateo, CA 94403  
(800) 851-2917  
(415) 345-5900  
fax: (415) 349-1356

Circle 1273 on Inquiry Card.

**Lightship 3.01, \$795**

Introduced: Sept. 1990  
Latest release: July 1991  
Supports DDE

Pilot Software, Inc.  
40 Broad St.  
Boston, MA 02109  
(800) 944-0094  
(617) 350-7035  
fax: (617) 695-1265

Circle 1272 on Inquiry Card.

The Lightship 3.01 graphical development environment helps you build applications that can access and analyze data in your company's database. The software includes logic and math functions, charting capabilities, group mode, and Lightship Lens, which incorporates DLLs for creating live links to data across a network. Lightship 3.01 also lets you create multi-dimensional views of data. (See "EIS Moves to the Desktop," June BYTE.)

FormWorx 2.01 provides over 500 ready-to-print forms and lets you design and fill in customized forms by pointing and clicking on design objects. Using desktop publishing tools, you design the form and then fill in form data on-screen. You can minimize typing by importing dBase files for automatic fill-in and validation.

**JetForm Design 3.0, \$495**

Introduced: Oct. 1988  
Latest release: Dec. 1991  
Supports DDE  
Add-ons: JetForm Filler/G,  
JetForm for E-mail

JetForm Corp.  
163 Pioneer Dr.  
Leominster, MA 01453  
(800) 267-7793  
(508) 840-8181  
fax: (508) 534-6023

Circle 1274 on Inquiry Card.

JetForm Design 3.0 lets you design and generate multipage forms. The software provides graphics, drawing, and text-handling tools with user-defined grids and an AutoTrace feature that can trace over scanned objects. You can zoom, pan, scale, rotate, and stretch objects, and JetForm Design includes the JetForm Filler data-entry program. (See "The Next Best Thing to the Paperless Office," November 1991 BYTE.)

**PerForm Pro 1.0, \$293**

Introduced: Sept. 1990  
Supports DDE

Delrina Technology, Inc.  
6830 Via Del Oro, Suite 240  
San Jose, CA 95119  
(800) 268-6082  
(408) 363-2345  
fax: (408) 363-2340

Circle 1275 on Inquiry Card.

PerForm Pro 1.0 includes forms design tools and more than 65 calculation functions that help you automate form filling. Features include a Fast Fill option, Form Folders to cut down on repetitive entry, direct links to databases including dBase, over 100 ready-to-use forms, and electronic signatures for security. PerForm Pro comes with the Agfa Type Director font-manager software. (See "The Next Best Thing to the Paperless Office," November 1991 BYTE.)

**INTEGRATED SOFTWARE**

**Microsoft Works 2.0 for Windows, \$199**

Introduced: Sept. 1991  
Supports DDE and OLE

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329

Circle 1276 on Inquiry Card.

The WorksWizards interactive templates in Microsoft Works 2.0 for Windows provide step-by-step guidance and prompt you for information as you create custom documents. The integrated software package also offers a WYSIWYG word processor, a spreadsheet, charting capabilities, a database, and drawing programs. Additional features include a toolbar, electronic "sticky tags" that you can attach to documents, and context-sensitive on-line help. (See "A Few of Our Favorite Things," June BYTE.)

**PFS:WindowWorks 1.3, \$149**

Introduced: May 1991

Spinner Software Corp.  
201 Broadway  
Cambridge, MA 02139  
(800) 323-8088  
(617) 494-1200  
fax: (617) 494-1219

Circle 1277 on Inquiry Card.

PFS:WindowWorks 1.3 integrates WYSIWYG word processing, page layout, spreadsheet, and database applications with features such as telecommunications, an address book, a label maker, and charting and business graphics software. The package supports multiple open windows; hot links between the word processor, spreadsheet, and chart modules; and on-line help.



LANGUAGES

BASIC

**CA-Realizer 1.0, \$247**

Introduced: May 1991  
Supports DDE

Computer Associates International, Inc.  
1 Computer Associates Plaza  
Islandia, NY 11788  
(800) 342-5224  
(516) 342-6000  
fax: (516) 342-5329  
**Circle 1278 on Inquiry Card.**

CA-Realizer 1.0 is a visual programming language that lets you create Windows applications without resorting to the Windows SDK (Software Development Kit). A structured superset of BASIC, CA-Realizer includes the FormDev visual forms tool. The package supports interface, spreadsheet, and table objects and includes an integrated debugger, direct Windows calls capability, and DLL support. (See "Two Ways to Program BASIC for Windows," October 1991 BYTE.)

**Visual Basic 1.0, \$199**

Introduced: May 1991  
Supports DDE and OLE  
Add-on: The Professional Toolkit for Visual Basic

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329  
**Circle 1279 on Inquiry Card.**

Visual Basic 1.0 combines graphical-interface design tools with a general-purpose programming language. You use the graphical design tools to create the user interface and then attach code to those items. The package includes an incremental compiler, automatic syntax checking, an integrated debugger, and on-line help. You can run your finished

programs in Visual Basic or as stand-alone EXE files. (See "A Few of Our Favorite Things," June BYTE, and "Two Ways to Program BASIC for Windows," October 1991 BYTE.)

C / C ++

**Borland C++ 3.1, \$495**

Introduced: Feb. 1991  
Latest release: June 1992  
Supports DDE and OLE  
Borland International, Inc.  
1800 Green Hills Rd.  
Scotts Valley, CA 95067  
(800) 331-0877  
(408) 438-8400  
fax: (408) 439-9119  
**Circle 1280 on Inquiry Card.**

Borland C++ 3.1 is a collection of programming tools for professional Windows developers who also develop under DOS. The package includes a command-line compiler, IDEs (integrated development environments) for Windows and DOS, a sophisticated debugger, and a fast optimizing compiler. (See "A Few of Our Favorite Things," June BYTE, and "Borland C++ 2.0 Moves into Windows Territory," June 1991 BYTE.)

**Borland C++ Application Frameworks 3.1, \$749**

Introduced: Nov. 1991  
Latest release: June 1992  
Supports DDE and OLE  
Borland International, Inc.  
1800 Green Hills Rd.  
Scotts Valley, CA 95067  
(800) 331-0877  
(408) 438-8400  
fax: (408) 439-9119  
**Circle 1281 on Inquiry Card.**

In addition to Borland C++ 3.1, the Borland C++ Application Frameworks 3.1 package includes ObjectWindows, Turbo Vision applications frameworks, run-time library source code, and the Windows API manual. The development system

also includes the Win-Spector utility for tracking down the source of Windows UAs (unrecoverable applications errors).

**Microsoft C/C++ Development System 7.0, \$499**

Introduced: Feb. 1992  
Supports DDE and OLE

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329  
**Circle 1282 on Inquiry Card.**

An OOP (object-oriented programming) development package, the Microsoft C/C++ Development System 7.0 includes the entire Windows SDK, the Windows 3.1 class libraries, the High-Performance Object

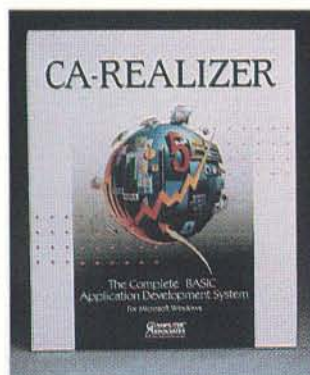
Technology optimizing compiler, design and applications framework tools, the CodeView C++ debugger, the Programmer's Workbench, and Qualitas's 386Max. (See "Microsoft's Lucky Number," September BYTE.)

**Microsoft QuickC for Windows 1.0, \$199**

Introduced: Aug. 1991  
Supports DDE and OLE

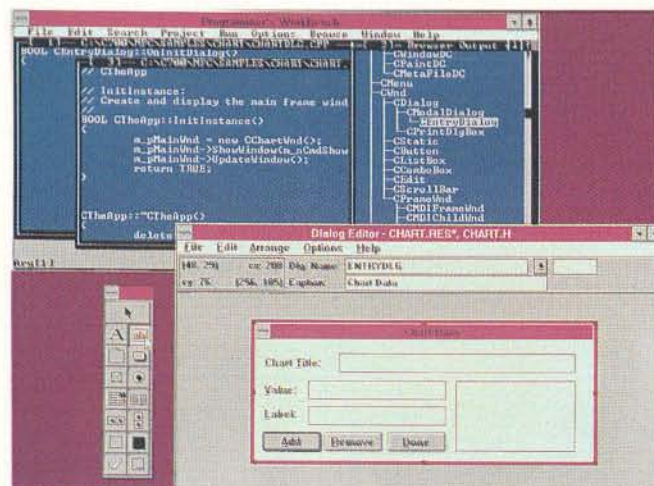
Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329  
**Circle 1283 on Inquiry Card.**

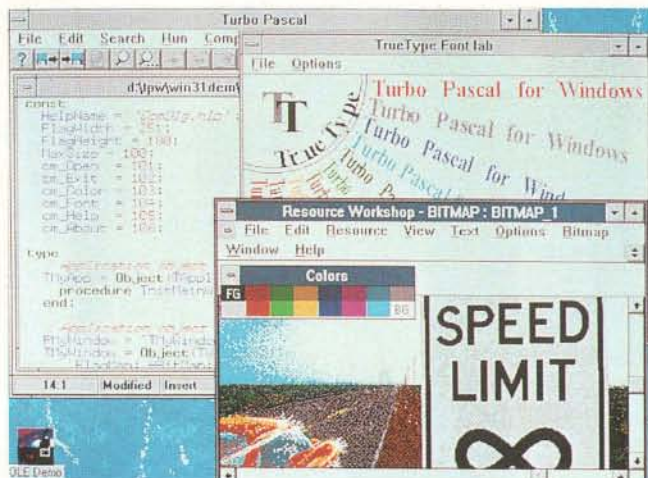
Microsoft QuickC for Windows 1.0 helps you develop and debug small Windows applications entirely within the Windows environment. The



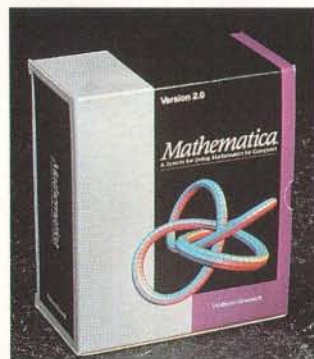
**CA-Realizer 1.0, Computer Associates International**

**Microsoft C/C++ Development System 7.0, Microsoft**





**Turbo Pascal for Windows 1.5, Borland International**



**Mathematica 2.1 for Windows, Wolfram Research**

package includes a compiler, a dialog-box editor, a debugger, an image object editor, a simple applications generator (i.e., QuickCase:W), a linker, a resource compiler, and a library manager. The on-line documentation includes hypertext links. (See "Swift Programming for Windows, in Windows," March BYTE.)

**Turbo C++ for Windows 3.1, \$149.95**

*Introduced: Nov. 1991  
Latest release: June 1992  
Supports DDE and OLE*

Borland International, Inc.  
1800 Green Hills Rd.  
Scotts Valley, CA 95067  
(800) 331-0877  
(408) 438-8400  
fax: (408) 439-9119

**Circle 1284 on Inquiry Card.**

**T**urbo C++ for Windows 3.1 is an inexpensive way to program in C and C++. The package includes the basic tools you need to create Windows applications, but it does not have the library source code, the professional tool set, or an optimizing compiler.

**Zortech C++ 3.0 for Windows, DOS, and OS/2, \$699**

*Introduced: Nov. 1990  
Latest release: Aug. 1991  
Supports DDE and OLE with Windows 3.1 Symantec Developers Kit*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
(408) 253-9600  
fax: (408) 253-4092

**Circle 1285 on Inquiry Card.**

**Z**ortech C++ 3.0 is a complete Windows development environment that includes an optimizing compiler, a source-level debugger, a royalty-free 32-bit DOS extender, the WINC library for automatically converting DOS command-line programs into Windows applications, and Blue Sky Software's Windows-Maker prototyper.

**PASCAL**

**Turbo Pascal for Windows 1.5, \$149.95**

*Introduced: March 1991  
Latest release: June 1992  
Supports DDE and OLE*

Borland International, Inc.  
1800 Green Hills Rd.  
Scotts Valley, CA 95067  
(800) 331-0877  
(408) 438-8400  
fax: (408) 439-9119

**Circle 1286 on Inquiry Card.**

**A**n object-oriented applications development system, Turbo Pascal for Windows 1.5 supports Windows 3.1 features such as OLE, common dialog boxes, drag-and-drop operation, and TrueType fonts. The system also includes a speed bar, the Turbo Debugger, and the Resource Workshop, a graphical design tool for creating user interfaces. (See "A Few of Our Favorite Things," June BYTE.)

**SMALLTALK**

**Smalltalk/V for Windows 2.0, \$499.95**

*Introduced: Jan. 1991  
Latest release: June 1991  
Supports DDE*

Digitalk, Inc.  
9841 Airport Blvd.  
Los Angeles, CA 90045  
(800) 531-2344  
(310) 645-1082  
fax: (310) 645-1306

**Circle 1287 on Inquiry Card.**

**T**he granddaddy of OOP (object-oriented programming) languages, Smalltalk/V for Windows 2.0 lets you design applications by building complex objects out of simpler ones, eliminating repetitive compile-link-run loops. The package includes standard Smalltalk/V features such as source code browsers, inspectors, and push-button debuggers. In addition, Smalltalk/V

supports the MDI (multiple document interface), the national language/double-byte character set, and DLLs.

**MATHEMATICS**

**Mathcad 3.1, \$495**

*Introduced: June 1991  
Latest release: Feb. 1992  
Supports OLE*

MathSoft, Inc.  
201 Broadway  
Cambridge, MA 02139  
(800) 628-4223  
(617) 577-1017  
fax: (617) 577-8829

**Circle 1288 on Inquiry Card.**

**M**athcad 3.1 acts as a sophisticated calculator that can handle complex arithmetic and calculations such as FFTs (fast Fourier transforms), symbolic factoring of polynomials, Bessel functions, matrices, and simultaneous linear and nonlinear equation-solving statistics. The live document interface acts like a scratchpad and lets you use regular math notation; Mathcad automatically recalculates functions and graphs when you change relationships or constants. (See "A Few of Our Favorite Things," June BYTE, and "What You See Is What You Solve: Mathematica and MathCAD for Windows," May BYTE.)

**Mathematica 2.1 for Windows, \$995**

*Introduced: Jan. 1992  
Latest release: June 1992*

Wolfram Research, Inc.  
100 Trade Center Dr.  
Champaign, IL 61820  
(800) 441-6284  
(217) 398-0700  
fax: (217) 398-0747

**Circle 1289 on Inquiry Card.**

**M**athematica can handle numerical, symbolic, and graphical computations. The software includes a built-in high-level symbolic programming language, a modeling and analy-

sis tool, and a computation server that works with spreadsheets and other programs. The notebook interface lets you mix text, graphics, animation, and sound. (See "What You See Is What You Solve: Mathematica and MathCAD for Windows," May BYTE.)

**MULTIMEDIA**

**AddImpact 1.0, \$129**

*Introduced: June 1992  
Supports DDE and OLE*

Gold Disk  
385 Van Ness Ave., Suite 110  
Torrance, CA 90501  
(310) 320-5080  
fax: (310) 320-0208  
**Circle 1290 on Inquiry Card.**

**A**ddImpact 1.0 lets you create and embed sound, narration, and animation sequences into any OLE-compatible presentation graphics program or other Windows applications. Animation or sound clips become embedded icons in the client application. You simply click on the icons, and the sound or animation sequence begins.

**Macromedia Action 2.0 for Windows, \$495**

*Introduced: Oct. 1991  
Latest release: July 1992  
Supports DDE*

Macromedia, Inc.  
600 Townsend St., Suite 310W  
San Francisco, CA 94103  
(800) 288-8108  
(415) 442-0200  
fax: (415) 442-0190  
**Circle 1291 on Inquiry Card.**

**W**ith the MPC-compatible Macromedia Action 2.0 for Windows, you can create interactive multimedia presentations that combine sound, text, and graphics animation. The software supports MIDI sound and features charting capabilities with automatic motion, a run-time player, multimedia templates, and an Import Pre-

sentation tool. (See "The Multimedia PC: High-Powered Sight and Sound on Your Desk," February BYTE.)

**Microsoft Bookshelf for Windows, 1991 edition, \$195**

*Introduced: Oct. 1991  
Latest release: July 1992*

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329  
**Circle 1292 on Inquiry Card.**

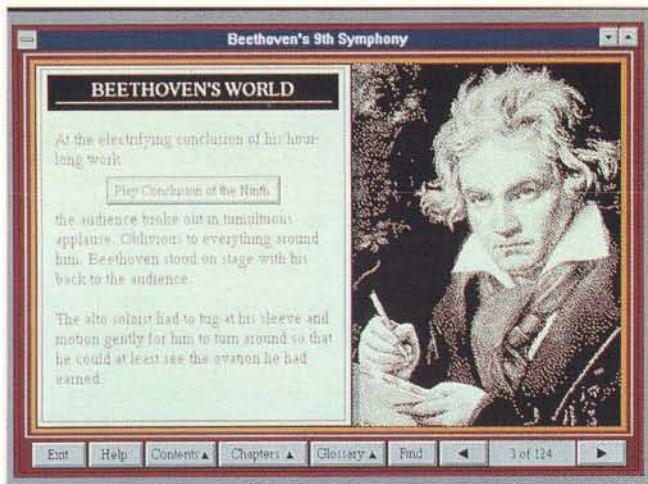
**M**icrosoft Bookshelf for Windows is the quintessential CD-ROM package. A core set of multimedia reference materials for your home or office features sound, animation, and an information-retrieval tool. Microsoft Bookshelf includes a speaking dictionary, an encyclopedia, a thesaurus, two references for quotations, an almanac, and an atlas. (See "The Multimedia PC: High-Powered Sight and Sound on Your Desk," February BYTE.)

**Microsoft Multimedia Beethoven: The Ninth Symphony 1.0, \$79.95**

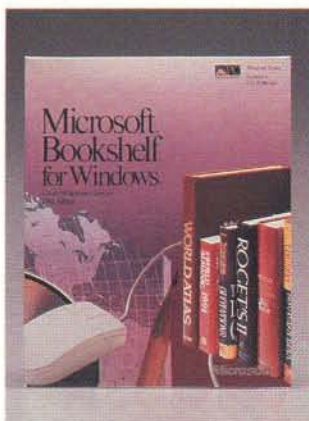
*Introduced: Oct. 1991*

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329  
**Circle 1293 on Inquiry Card.**

**E**xplore any section from the four movements of Beethoven's Ninth Symphony with Microsoft's multimedia program on CD-ROM. The program features a digital stereo audio track and accompanying sound and images that explain Beethoven's Ninth Symphony. You can learn about Beethoven's life, review a measure-by-measure commentary, play an



**Microsoft Multimedia Beethoven: The Ninth Symphony 1.0, Microsoft**



**Microsoft Bookshelf for Windows, 1991 edition, Microsoft**

interactive game based on the symphony, and learn about a symphony's musical architecture.

**OCR / SCANNING**

**NISCAN/GS OCR for Windows, \$529**

*Introduced: Jan. 1991  
Latest release: May 1992  
Supports DDE and OLE*

NISCA, Inc.  
1919 Old Denton Rd.,  
Suite 104  
Carrollton, TX 75006  
(800) 245-7226  
(214) 242-9696  
fax: (214) 245-0942  
**Circle 1294 on Inquiry Card.**

**A** bundled package containing a hand-held scanner and Perceive Personal OCR for

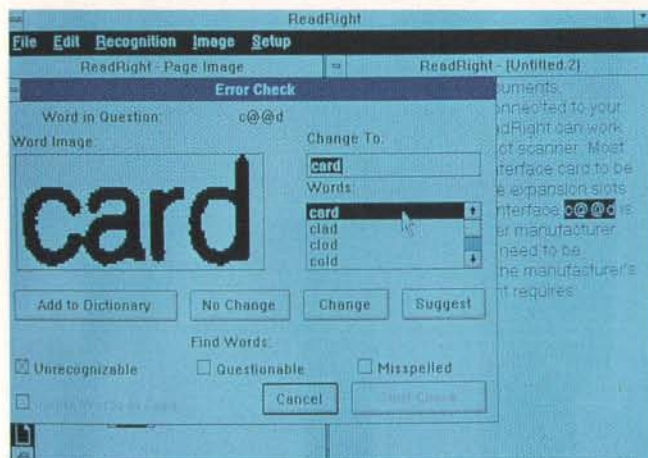
Windows software, NISCAN/GS OCR for Windows also includes image-editing features for scanned photographs, halftones, and line art and supports 8-bit, 256-shade gray-scale graphics images. It can read point sizes from 8 to 36, and it requires no training.

**OmniPage Professional 2.0, \$995**

*Introduced: Sept. 1991  
Supports DDE*

Caere Corp.  
100 Cooper Court  
Los Gatos, CA 95030  
(800) 535-7226  
(408) 395-7000  
fax: (408) 354-2743  
**Circle 1295 on Inquiry Card.**

**O**mniPage Professional 2.0 incorporates Hewlett-Packard's AccuPage OCR (optical character recognition) technology



**ReadRight 3.1, Adobe Systems**



**ScanMan Model 256 with FotoTouch, Logitech**

for scanning low-quality documents and Caere's AnyFont technology. It can read documents scanned upside down, in column format, or from dot-matrix printers, and it has a gray-scale editor that creates black-and-white or continuous-tone images with up to 256 shades of gray. The package also includes a spelling checker and an OCR training program. (See "Tame the Paper Tiger," April 1991 BYTE.)

**ReadRight 3.1, \$199**

*Introduced: Feb. 1991  
Latest release: June 1991*

Adobe Systems, Inc.  
1585 Charleston Rd.  
Mountain View, CA 94043  
(800) 833-6687

(415) 961-4400  
fax: (415) 961-3769  
**Circle 1296 on Inquiry Card.**

**R**eadRight page-recognition software automatically detects the mode in which Windows is running and loads a DDL (document description language) that optimizes performance. Other features include the ability to monitor the recognition process to gauge accuracy, multiple zoom levels, a user dictionary, delayed processing, a pop-up error checker, and text/graphics page decomposition. (See "Tame the Paper Tiger," April 1991 BYTE.)

**ScanMan Model 256 with FotoTouch, \$449**

*Introduced: Aug. 1990  
Latest release: Jan. 1992*

Logitech, Inc.  
6505 Kaiser Dr.  
Fremont, CA 94555  
(800) 231-7717  
(510) 795-8500  
fax: (510) 792-8901  
**Circle 1297 on Inquiry Card.**

**L**ogitech has bundled the ScanMan Model 256, an 8-bit, 256-gray-scale hand scanner, and FotoTouch, an image-editing software package that lets you stitch multipass images together. The software also includes features such as lighten, darken, and negative effects; resize and rotate; brighten; contrast; and zoom. An image-skew tool helps you correct skewing errors from imprecise scans.

**WordScan Plus 1.1, \$695**

*Introduced: July 1990  
Latest release: May 1992  
Supports DDE*

Calera Recognition Systems, Inc.  
475 Potrero Ave.  
Sunnyvale, CA 94086  
(800) 544-7051  
(408) 720-0999  
fax: (408) 720-1330  
**Circle 1298 on Inquiry Card.**

**W**ordScan Plus 1.1 is an omnifont OCR program that you can run stand-alone from within Word for Windows to scan text directly into a Word document. WordScan Plus also features deferred processing of scanned images, preview page, fax support, style sheets, multijob processing, and the Verifier, which marks questionable words or characters. (See "Tame the Paper Tiger," April 1991 BYTE.)

**ORGANIZATIONAL CHARTING**

**OrgPlus for Windows 1.0, \$199.99**

*Introduced: Feb. 1992*  
Banner Blue Software  
39500 Stevenson Place,  
Suite 204  
Fremont, CA 94539  
(510) 794-6850  
fax: (510) 794-9152  
**Circle 1299 on Inquiry Card.**

**O**rgPlus for Windows 1.0 lets you create corporate organizational charts that have up to 32,000 boxes and 50 levels. The package provides automatic chart drawing, customizable formatting, and compact layouts. You can enter and edit names, titles, and other information (including photographic images) directly into chart boxes. The package includes Adobe Type Manager.

**Windows OrgChart 2.0, \$149.95**

*Introduced: June 1991  
Latest release: Oct. 1991*  
Micrografx, Inc.  
1303 Arapaho Rd.  
Richardson, TX 75081  
(800) 733-3729  
(214) 234-1769  
fax: (214) 234-2410  
**Circle 1300 on Inquiry Card.**

**W**indows OrgChart 2.0 lets you graphically construct organization charts and tree hierarchies. The software features automatic line drawing and box alignment and point-and-click facilities for adding, deleting, or promoting personnel; linking detailed notes; or including scanned photos. OrgChart can scale your charts to fit onto a page, and it lets you have multiple typefaces in each box. (See "Art for Business's Sake," April BYTE.)

PERSONAL FINANCE

**ACCPAC Simply Accounting 2.0, \$199**

Introduced: April 1991  
 Latest release: Sept. 1992  
 Supports DDE

Computer Associates International, Inc.  
 1 Computer Associates Plaza  
 Islandia, NY 11788  
 (800) 342-5224  
 (516) 342-6000  
 fax: (516) 342-5329  
**Circle 1301 on Inquiry Card.**

**Peachtree Accounting for Windows 5.0, \$99**

Introduced: Feb. 1991  
 Latest release: March 1992  
 Supports DDE and OLE

Peachtree Software, Inc.  
 1505-C Pavilion Place  
 Norcross, GA 30093  
 (800) 548-9179  
 (404) 564-5800  
 fax: (404) 564-5888  
**Circle 1303 on Inquiry Card.**

Designed for small business users, ACCPAC Simply Accounting 2.0 is an integrated, entry-level, graphical accounting system that features automatic transaction posting; pop-up customer, vendor, job, employee, account, and inventory lists; and month- and year-end closing routines that let you complete formatted balance sheets, income statements, and standard reports with a single keystroke.

Peachtree Software's small-business accounting system lets you track daily receivables and payables, assess current inventory and other assets, examine profitability by item, perform weighted average costing, and create valuation and low-stock reports. Peachtree Accounting for Windows 5.0 includes a general ledger, invoicing, budgeting, payroll, job costing, bank reconciliation, and financial report writing.

**Microsoft Money 1.0, \$69.95**

Introduced: Sept. 1991

Microsoft Corp.  
 1 Microsoft Way  
 Redmond, WA 98052  
 (800) 426-9400  
 (206) 882-8080  
 fax: (206) 936-7329  
**Circle 1302 on Inquiry Card.**

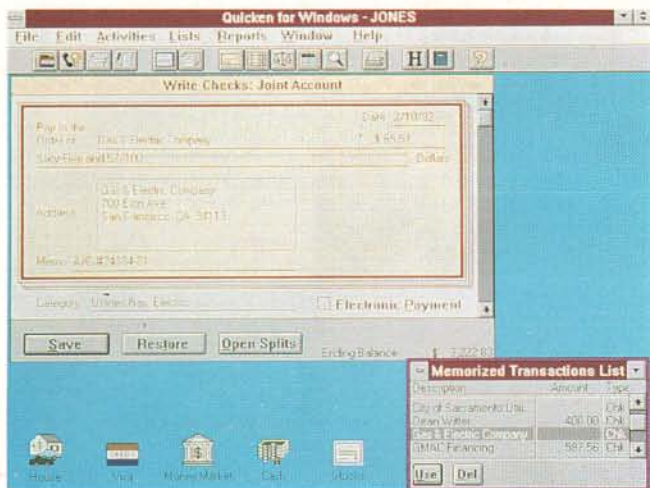
Microsoft designed Microsoft Money 1.0 for individuals and small businesses that need a fast, easy way to keep track of their finances. The program works as an electronic checkbook and automates the routine tasks associated with paying bills, creating and tracking budget account balances, viewing and summarizing transactions, and reporting and reconciling financial statements.

**Quicken for Windows 1.01, \$69.95**

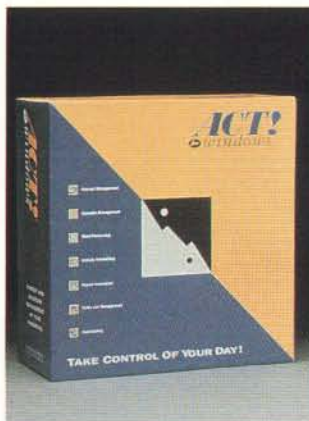
Introduced: Oct. 1991  
 Latest release: March 1992  
 Supports DDE

Intuit  
 1830 Embarcadero  
 Palo Alto, CA 94303  
 (800) 624-8742  
 (415) 322-0573  
 fax: (415) 329-2785  
**Circle 1304 on Inquiry Card.**

Quicken for Windows 1.01 keeps track of your checking, savings, credit cards, cash, stocks, bonds, mutual funds, mortgages, loans, assets, and liabilities. You can keep multiple account windows open simultaneously, automate recurring payments, and pay bills by modem with CheckFree. Quicken for Windows also creates cash flow, profit-and-loss, and balance-sheet reports.



**Quicken for Windows 1.01, Intuit**



**Act for Windows 1.0, Contact Software International**

PERSONAL INFORMATION MANAGERS

**Act for Windows 1.0, \$495**

Introduced: June 1992  
 Supports DDE

Contact Software International, Inc.  
 1840 Hutton Dr., Suite 200  
 Carrollton, TX 75006  
 (800) 365-0606  
 (214) 919-9500  
 fax: (214) 919-9760  
**Circle 1305 on Inquiry Card.**

Designed for sales professionals, Act for Windows 1.0 is a contacts database with 71 customizable fields, password security, data import and export to dBase and RTF (Rich Text File) formats, and a pop-up calculator. The package also provides a calendar, a word

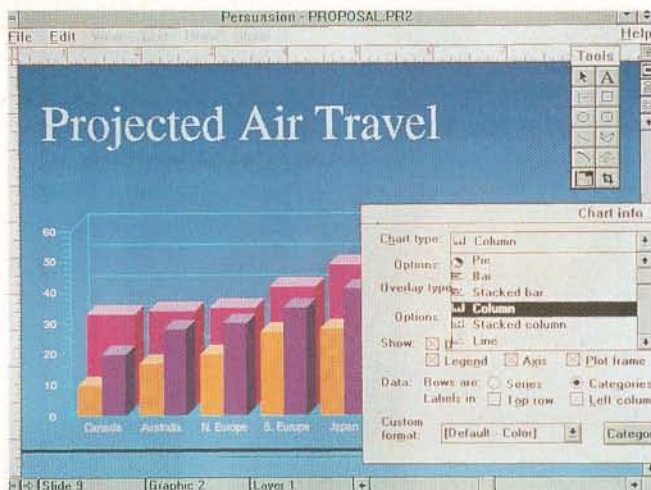
processor, a spelling checker, a report generator, a macro builder, and a telephone book with auto-dialer. Act for Windows also features call, meeting, and task scheduling and prioritization and automatic scheduling for recurring events. (See "A Few of Our Favorite Things," June BYTE.)

**Ascend 3.14, \$299**

Introduced: Nov. 1990  
 Latest release: Oct. 1991

NewQuest Technologies, Inc.  
 2550 South Decker Lake Blvd., Suite 26  
 Salt Lake City, UT 84119  
 (800) 877-1814  
 (801) 975-9992  
 fax: (801) 975-9995  
**Circle 1306 on Inquiry Card.**

Combining an electronic calendar with the Franklin Day Planner, Ascend 3.14 prints



**Persuasion 2.1, Aldus**

Polaris Software  
17150 Via Del Campo,  
Suite 307  
San Diego, CA 92127  
(800) 722-5728  
(619) 674-6500  
fax: (619) 674-7315  
**Circle 1308 on Inquiry Card.**

An all-in-one PIM (personal information manager), PackRat 4.0 provides an appointment calendar, a to-do list, a project tracker, a phone book with auto-dialer and log, a hard disk file manager, a finance manager, a reminder system, and customizable SmartButtons, and free-form notes. The PackRat Integration Library (\$29.95) lets you integrate PackRat with popular word processors. PackRat 4.0 is also available in a groupware version. (See "Managing Your Contacts.")

**PRESENTATION SOFTWARE**

**ABC Flowcharter 1.13, \$295**

*Introduced: Dec. 1989  
Supports DDE*

Micrografx, Inc.  
1303 East Arapaho Rd.  
Richardson, TX 75081  
(800) 733-3729  
(214) 234-1769  
fax: (214) 234-2410  
**Circle 1309 on Inquiry Card.**

ABC Flowcharter 1.13's point-and-click interface helps you create sophisticated flow-charts that break down complex procedures into simpler components. The software includes a navigational grid for moving through charts, automatic line drawing and shape alignment, drawing tools, a library of 30 standard flowchart shapes, a variety of arrowhead styles and sizes, and the ability to import custom shapes. (See "Art for Business's Sake," April BYTE.)

**Aldus Persuasion 2.1, \$495**

*Introduced: May 1991  
Latest release: Feb. 1992  
Supports DDE and OLE*

Aldus Corp.  
411 First Ave. S  
Seattle, WA 98104  
(800) 685-3540  
(206) 622-5500  
fax: (206) 343-4240

**Circle 1310 on Inquiry Card.**

Aldus Persuasion 2.1 helps you create presentation outlines, slides, speaker notes, and audience handouts with features such as multiple master pages; special-effects tools; an outline processor; automatic slide layout, charting, graphing, and drawing tools; on-screen transition effects; and the Persuasion Player on-screen viewer. Persuasion comes bundled with Adobe Type Manager. (See "The Perfect Pitch," December 1991 BYTE.)

**CA-Cricket Graph 1.3.1, \$129**

*Introduced: Aug. 1989  
Latest release: March 1991*

Computer Associates International, Inc.  
1 Computer Associates Plaza  
Islandia, NY 11788  
(800) 342-5224  
(516) 342-6000  
fax: (516) 342-5329

**Circle 1311 on Inquiry Card.**

The CA-Cricket Graph 1.3.1 charting program lets you create 12 chart types, including scatter, line, stacked bar, pie, column, text, area, stacked column, double y axes, bar, polar, and overlay combinations. You can customize graphs with eight bar patterns, 15 plot symbols, five line styles, four line widths, and 11 outline fonts. Editing features include stretch, shrink, regression curve fits, and depth effects. (See "Art for Business's Sake," April BYTE, and "The Perfect Pitch," December 1991 BYTE.)



**Presentation Task Force 4.0, New Vision Technologies**

pages that fit into the Day Planner notebook. You get a prioritized daily task list, an appointment schedule, an address and phone book, an auto-dialer, a master task list, a daily record of events, a personal journal, red tabs for flagging key information, a goal tracker, a weekly appointment view, and a file organizer. (See "Managing Your Contacts.")

**OnTime 1.2, \$129.95**

*Introduced: May 1991  
Latest release: June 1992*

Campbell Services, Inc.  
21700 Northwestern Hwy.,  
Suite 1070  
Southfield, MI 48075  
(800) 345-6747  
(313) 559-5955  
fax: (313) 559-1034

**Circle 1307 on Inquiry Card.**

The OnTime 1.2 scheduling program includes a tickler file, an appointment alarm, a to-do list, and an event calendar with day, week, and month views. You can categorize and prioritize events and print detailed, threefold itineraries, calendars, and to-do lists. OnTime is also available as a group scheduler. (See "Getting Groups On Schedule," September 1991 BYTE.)

**PackRat 4.0, \$395**

*Introduced: May 1988  
Latest release: Oct. 1991  
Supports DDE  
Add-on: The PackRat Integration Library 1.0*

**Charisma 2.1, \$495**

*Introduced: July 1990  
Latest release: July 1991  
Supports OLE*

Micrografx, Inc.  
1303 East Arapaho Rd.  
Richardson, TX 75081  
(800) 733-3729  
(214) 234-1769  
fax: (214) 234-2410

**Circle 1312 on Inquiry Card.**

A business graphics package, Charisma 2.1 includes 80 templates, 40 predefined chart types, 2200 clip-art images, 30 import and export filters, special-effects tools, and a slide-show builder. The package also includes 41 scalable outline fonts, customizable bullets, 13 drawing tools, and TeleGrafx, a telecommunications utility that lets you send graphics files to imaging centers. (See "The Perfect Pitch," December 1991 BYTE.)

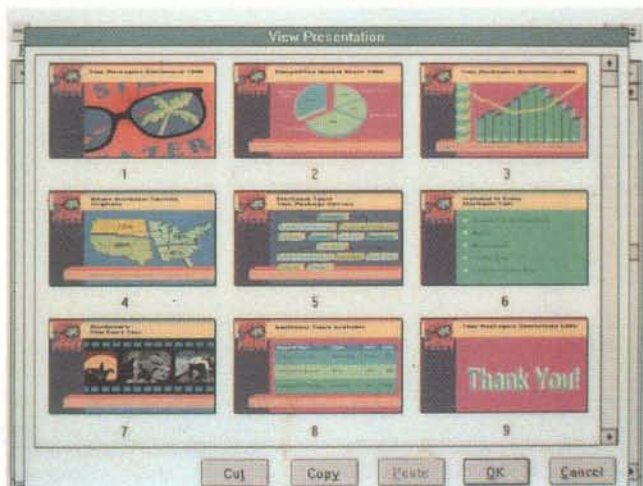
**Claris Hollywood 1.0 version 2, \$499**

*Introduced: May 1991  
Latest release: Feb. 1992  
Supports DDE*

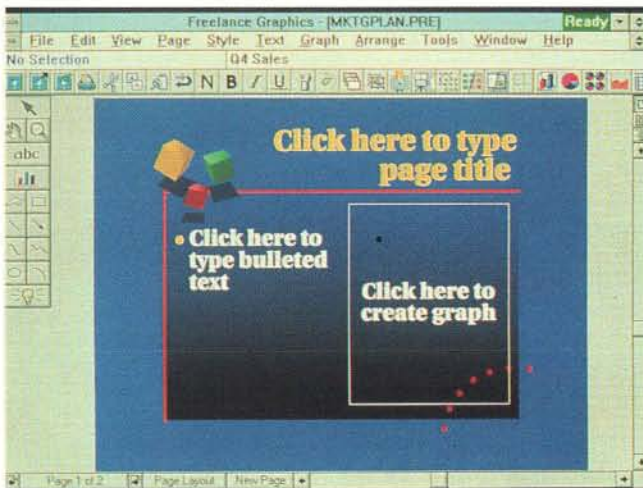
Claris Corp.  
5201 Patrick Henry Dr.  
Santa Clara, CA 95052  
(408) 727-8227

**Circle 1313 on Inquiry Card.**

Claris Hollywood 1.0 version 2 lets you create transparencies, slides, hard copy, on-screen presentations, speaker notes, and audience handouts. The software features a slide sorter; on-screen presentation controls with fade, dissolve, and automatic slide "build" effects; integrated outliner links; a spelling checker; a chart builder; clip art; search and replace functions; and extensive file-exchange capabilities. (See "A Few of Our Favorite Things," June BYTE, and "The Perfect Pitch," December 1991 BYTE.)



**Hollywood 1.0 version 2, Claris**



**Freelance Graphics for Windows 1.0, Lotus Development**

**Freelance Graphics for Windows 1.0, \$495**

*Introduced: Oct. 1991  
Latest release: March 1992  
Supports DDE and OLE*

Lotus Development Corp.  
Graphics Product Group  
161 First St.  
Cambridge, MA 02142  
(800) 343-5414  
(617) 577-8500  
fax: (617) 693-4551

**Circle 1314 on Inquiry Card.**

Freelance Graphics for Windows 1.0 provides more than 60 ready-made presentation pages, a customizable icon palette, a 10-level undo command, and task-oriented on-line tutorials. The business graphics package also includes a pre-

sentation outliner, a 130,000-word spelling checker, global change capability, a page sorter, and a screen-show builder. (See "A Few of Our Favorite Things," June BYTE.)

**Harvard Graphics for Windows 1.0, \$595**

*Introduced: Dec. 1991  
Supports DDE*

Software Publishing Corp.  
3165 Kifer Rd.  
Santa Clara, CA 95051  
(408) 986-8000  
fax: (408) 980-0729

**Circle 1315 on Inquiry Card.**

The Hypershow feature in Harvard Graphics for Windows

1.0 lets you create interactive presentations that display back-up charts and graphs when you select an on-screen button during the main presentation. This presentation graphics package offers 88 layouts, icons for creating slides, and 54 presentation styles. With the applications launcher, you can run another application from within Harvard Graphics for Windows. (See "Art for Business's Sake," April BYTE.)

**PowerPoint 3.0, \$495**

*Introduced: May 1990  
Latest release: April 1992  
Supports DDE and OLE*

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329

**Circle 1316 on Inquiry Card.**

PowerPoint 3.0 supports embedded TrueType fonts and includes outlining and text-formatting functions, a tool for creating 24 shapes, a free-form drawing tool, and 84 pre-designed graph types. The software provides tools for electronic presentations that include flying bullets, a run-time viewer, and 40 transition effects, such as wipes, dissolves, and fades. PowerPoint has a customizable toolbar and supports Windows for Pen Computing, MCI (Media Control Interface) sound, and AVI (Audio Video Interactive). (See "A Power Boost for PowerPoint," September BYTE.)

**Presentation Task Force 4.0, \$199**

*Introduced: June 1989  
Latest release: Feb. 1992*

New Vision Technologies, Inc.  
38 Auriga Dr., Unit 13  
Nepean, Ontario,  
Canada K2E 8A5  
(613) 727-8184  
fax: (613) 727-8190

**Circle 1317 on Inquiry Card.**

**P**resentation Task Force 4.0 is a compendium of more than 3500 full-color clip-art images that you can use with Windows programs that import CGM files. Images are organized by subject and cataloged in the 400-page manual. You can print the images in color or in black and white.

**Stanford Graphics 2.0, \$495**

*Supports DDE and OLE*

3-D Visions Corp.  
2780 Skypark Dr.  
Torrance, CA 90505  
(800) 729-4723  
(310) 325-1339  
fax: (310) 325-1505

**Circle 1318 on Inquiry Card.**

**T**he high-end Stanford Graphics 2.0 presentation graphics program includes data-analy-

**On Target 1.0, Symantec**

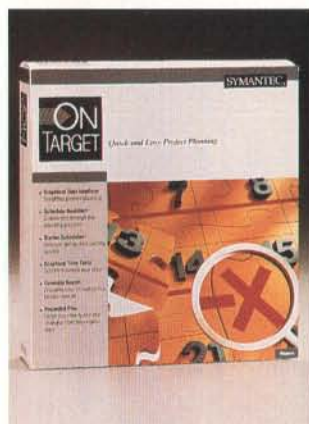
sis, statistical, and scientific functions in a 70-trillion-cell spreadsheet. The program features the Graph Gallery (more than 160 2-D and 3-D business graphs), on-screen data manipulation, intelligent style masters, and a WYSIWYG outliner. The Prime Time Screen Show feature lets you create run-time versions of your presentations that you can't view without a copy of Stanford Graphics.

**PROJECT MANAGEMENT**

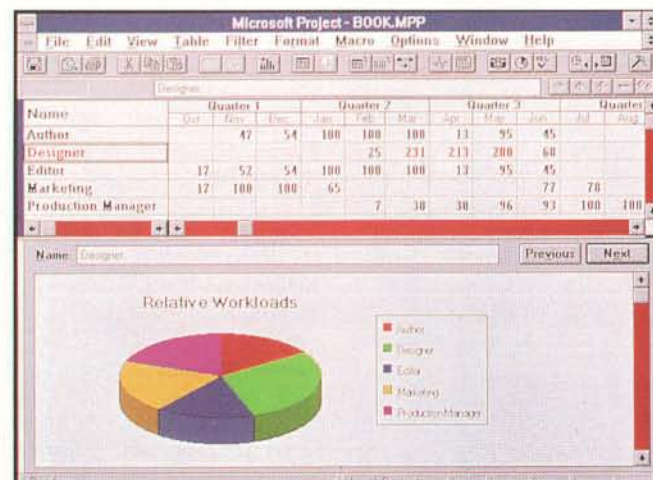
**CA-SuperProject for Windows 2.0a, \$895**

*Introduced: Oct. 1991  
Latest release: May 1992*

Computer Associates International, Inc.  
1 Computer Associates Plaza  
Islandia, NY 11788



**Microsoft Project for Windows 3.0, Microsoft**



(800) 342-5224  
(516) 342-6000  
fax: (516) 342-5329

**Circle 1319 on Inquiry Card.**

**C**A-SuperProject for Windows 2.0a is a group of project management and presentation tools that you can use for progress tracking and evaluation, multi-project management, scheduling, resource leveling, and costing. The package lets you create Gantt, Cost/Resource, PERT (Program Evaluation and Review Technique), and WBS (Work Breakdown Structure) charts, and it accepts data from Time Slips' Time Sheets Professional time and billing software. Multiplatform support lets you consolidate project management between DOS, Windows, and VAX/VMS systems, and a MDI (multiple document interface) allows multiple views of the same project or of different projects simultaneously. (See "Tracking the Elusive Project.")

**Microsoft Project for Windows 3.0, \$695**

*Introduced: May 1990  
Latest release: Jan. 1992  
Supports DDE and OLE*

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329

**Circle 1320 on Inquiry Card.**

**M**icrosoft Project for Windows 3.0 lets you manage schedules, resources, and expenses. The software lets you create PERT and Gantt charts, model resource use, manage resources across multiple projects, and track your progress. Microsoft Project for Windows performs automatic resource leveling and has a customizable toolbar and macro capability. (See "Tracking the Elusive Project.")

**On Target 1.0, \$399**

*Introduced: April 1991*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
(408) 253-9600  
fax: (408) 253-4092

**Circle 1321 on Inquiry Card.**

**O**n Target 1.0 provides basic project management and planning assistance without a steep learning curve, replacing project management lingo with plain English. Key features include a point-and-click interface, a schedule assistant, starter schedules, a graphical time table, and calendar reports. You can create reports and presentations with predesigned or custom formats. (See "Tracking the Elusive Project.")

**Time Line for Windows 1.0, \$699**

*Introduced: March 1992  
Supports DDE and OLE*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
(408) 253-9600  
fax: (408) 253-4092

**Circle 1322 on Inquiry Card.**

**T**ime Line for Windows 1.0 tracks, controls, and reports the status of complex projects, and it creates detailed schedules with up to 8000 tasks per file. You can create effort-driven, critical-path, and project/task-priority scheduling and make individual resource calendars, perform resource leveling, and schedule forward or backward. Most of Time Line's functions are accessible through an icon bar. (See "Tracking the Elusive Project.")



## SPREADSHEETS

**Lotus 1-2-3 for Windows 1.1, \$595**

Introduced: Aug. 1991  
 Latest release: April 1992  
 Supports DDE

Lotus Development Corp.  
 55 Cambridge Pkwy.  
 Cambridge, MA 02142  
 (800) 343-5414  
 (617) 577-8500  
 fax: (617) 253-9150

**Circle 1323 on Inquiry Card.**

In addition to a new Windows interface, the Lotus 1-2-3 for Windows 1.1 graphical spreadsheet offers the standard DOS interface and file compatibility with other versions of Lotus 1-2-3. Among the features are more than 70 customizable smart icons, zoom, in/out, fast preview, and support for DOS macros. The spreadsheet comes bundled with Adobe Type Manager. (See "Spreadsheets Under Scrutiny" in this issue, and "Captains of Crunch," March BYTE.)

**Microsoft Excel for Windows 4.0, \$495**

Introduced: Oct. 1987  
 Latest release: March 1992  
 Supports DDE and OLE

Microsoft Corp.  
 1 Microsoft Way  
 Redmond, WA 98052  
 (800) 426-9400  
 (206) 882-8080  
 fax: (206) 936-7329

**Circle 1324 on Inquiry Card.**

The advanced analytical tools in Microsoft Excel for Windows 4.0 snap in and out to save memory. The spreadsheet package also includes drag-and-drop operation, wizards (i.e., on-line assistants that walk you through complex tasks), automatic spreadsheet formatting, shortcut menus, task-oriented toolbars, and a chart and report builder. Microsoft Excel will also run Lotus 1-2-3 macros. (See "Spreadsheets Under

Scrutiny" in this issue, and "Captains of Crunch," March BYTE.)

**Quattro Pro for Windows 1.0, \$495**

Introduced: October 1992  
 Supports DDE

Borland International, Inc.  
 1800 Green Hills Rd.  
 Scotts Valley, CA 95067  
 (800) 331-0877  
 (408) 438-8400  
 fax: (408) 439-9119

**Circle 1325 on Inquiry Card.**

Quattro Pro for Windows 1.0 lets you create spreadsheets that are set up as Notebooks. The Dialogue Builder lets you write customized Quattro Pro applications, the Data Base Desktop provides a data link to dBase and Paradox data, and the Object Inspector Menu lets you take advantage of the right mouse button. Quattro Pro for Windows also includes a full presentation package with graphics and page-layout facilities. (See "Spreadsheets Under Scrutiny" in this issue, and "Captains of Crunch," March BYTE.)

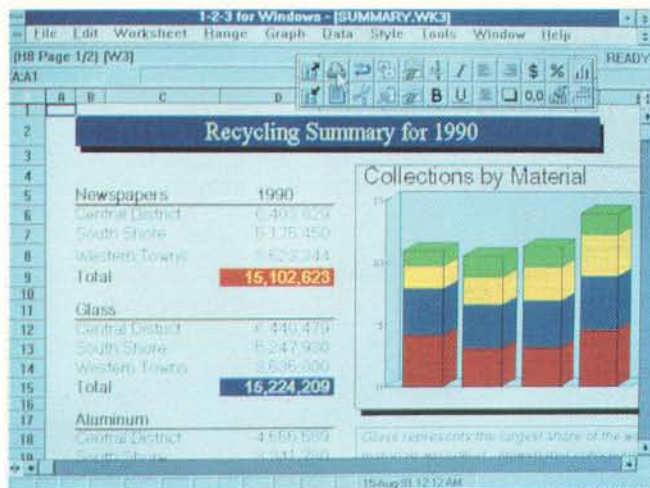
**Wingz for Windows 1.1a, \$499**

Introduced: July 1990  
 Latest release: Summer 1992  
 Supports DDE  
 Add-on: The Wingz-DataLink

Informix Software, Inc.  
 4100 Bohannon Dr.  
 Menlo Park, CA 94025  
 (800) 438-7627  
 (415) 926-6300  
 fax: (415) 926-6593

**Circle 1326 on Inquiry Card.**

A graphical spreadsheet, Wingz for Windows 1.1a provides more than 140 built-in



**Lotus 1-2-3 for Windows 1.1, Lotus Development**

functions, graphing and charting capabilities, analytical and presentation graphics tools, WYSIWYG print previews, and the Hyperscript applications development language. You can access Informix SQL

(Structured Query Language) databases from within a Wingz spreadsheet using the optional Wingz-DataLink software. (See "A Few of Our Favorite Things," June BYTE.)

## UTILITIES/ENHANCEMENTS

**Adobe Type Manager 2.0 for Windows, \$99**

Introduced: June 1990  
 Latest release: Nov. 1991

Adobe Systems, Inc.  
 1585 Charleston Rd.  
 Mountain View, CA 94043  
 (800) 833-6687  
 (415) 961-4400  
 fax: (415) 961-3769

**Circle 1327 on Inquiry Card.**

Adobe Type Manager 2.0 for Windows adds 13 scalable fonts to the Windows 3.1 environment and works with Type 1 fonts to smooth out the jagged edges on paper and on the screen. The on-screen font-manager software automatically downloads new fonts to PostScript printers and can optionally defer to printer-resident Hewlett-Packard scalable fonts of the same name on HP LaserJet III printers. Additional fonts are available. (See "Windows Display Managers File Rough Edges from Text," June 1991 BYTE.)

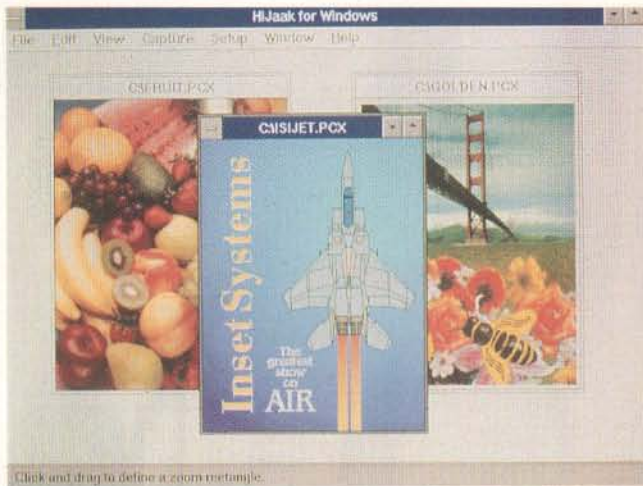
**Bitstream FaceLift 2.0 for Windows, \$99**

Introduced: Aug. 1990  
 Latest release: March 1992

Bitstream, Inc.  
 215 First St.  
 Cambridge, MA 02142  
 (800) 522-3668  
 (617) 497-6222  
 fax: (617) 868-4732

**Circle 1328 on Inquiry Card.**

Bitstream FaceLift 2.0 for Windows gives you smoother-looking fonts on-screen and from your printer. The package can create fonts in any size for most screen displays and for printers supported by Windows 3.0 and 3.1. Version 2.0 features increased character-generation speed, PostScript Type 1 support, 16 scalable fonts, and access to 14 additional character sets. Other fonts are available. (See "Windows Display Managers File Rough Edges from Text," June 1991 BYTE.)



**HiJaak for Windows 1.0, Inset Systems**

**Bitstream MakeUp 1.01, \$149**

*Introduced: Feb. 1992  
Latest release: Aug. 1992*

Bitstream, Inc.  
215 First St.  
Cambridge, MA 02142  
(800) 522-3668  
(617) 497-6222  
fax: (617) 868-4732

**Circle 1329 on Inquiry Card.**

**B**itstream MakeUp 1.01's five typefaces and clip-art images let you create special effects with type. You get full typographic controls, including line spacing and kerning, which you can use to create masks, shadows, 3-D type, and perspective or to edit the Bézier outlines of characters.

**Fastback Plus Windows 1.0, \$189**

*Introduced: Feb. 1992*  
Fifth Generation Systems, Inc.  
10049 Reiger Rd.  
Baton Rouge, LA 70809  
(504) 291-7221  
fax: (504) 291-5453  
**Circle 1330 on Inquiry Card.**

**A** high-speed automated backup program, Fastback Plus Windows 1.0 features an express menu, a Quick Tag feature for selecting files and directories, automatic formatting

of disks or tapes, data compression, file encryption, error correction, and on-line help. You can also back up files from more than one disk drive and to any DOS device, including Bernoulli cartridges, optical media, and removable hard drives. Fastback Plus Windows is network-compatible.

**HiJaak for Windows 1.0, \$249**

*Introduced: Feb. 1992  
Supports OLE*

Inset Systems, Inc.  
71 Commerce Dr.  
Brookfield, CT 06804  
(203) 740-2400  
fax: (203) 775-5634  
**Circle 1331 on Inquiry Card.**

**H**iJaak for Windows 1.0 can capture, view, edit, print, and convert images. It can handle conversions for 24 raster formats, 25 fax-board formats, and 16 vector formats and perform conversions in the background. The graphics utility supports the MDI (multiple document interface) and drag-and-drop file viewing.

**NewWave 4.0, \$195**

*Introduced: Nov. 1987  
Latest release: March 1992  
Supports DDE and OLE*

Hewlett-Packard Co.  
974 East Arques Ave.  
Sunnyvale, CA 94086  
(800) 554-1305  
(408) 720-3006  
fax: (408) 720-3560  
**Circle 1332 on Inquiry Card.**

**N**ewWave 4.0 is a Windows desktop replacement program that extends the Windows drag-and-drop metaphor. The program replaces the file manager with a series of nested folders and file drawers and turns files into objects that, when you click on them, can launch their original applications. To print a file, you drag and drop objects onto the print icon. (See "Four Windows Desktops.")

**Norton AntiVirus 2.0 for DOS and Windows, \$129**

*Introduced: Jan. 1992*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
(408) 253-9600  
fax: (408) 252-4694  
**Circle 1333 on Inquiry Card.**

**T**he Norton AntiVirus 2.0 package can find and repair more than 1000 viruses. The software scans your files, your hard disk's boot sector, and your PC's memory. It scans automatically in the background and detects changes to files that may indicate an unknown virus. You can load the scanning TSR program into high memory. The package also features password protection and recursive scan and repair.

**Norton Backup 2.0 for Windows, \$149**

*Introduced: July 1991  
Latest release: June 1992*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
(408) 253-9600  
fax: (408) 252-4694  
**Circle 1334 on Inquiry Card.**

**N**orton Backup 2.0 for Windows' drag-and-drop operation simplifies and automates data backup. The package features emergency DOS restore, 40- or 80-QIC (quarter-inch cartridge) tape-drive support, backup reports, file-version checking, file compression, password protection, and enhanced network support. Norton Backup automatically formats floppy disks during backups.

**Norton Desktop 2.0 for Windows, \$179**

*Introduced: June 1991  
Latest release: April 1992  
Supports DDE*

Symantec Corp.  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
(408) 253-9600  
fax: (408) 252-4694  
**Circle 1335 on Inquiry Card.**

**T**he Windows-based file management and repair tools in the Norton Desktop 2.0 for Windows package include drag-and-drop operation, TrueType support, backup capability, antivirus functions, file-repair programs, file viewers, a macro recording capability, a desktop editor, network support, and automatic desktop arrangement. Norton Desktop can also uninstall itself. (See "Four Windows Desktops.")

**Publisher's PowerPak, \$79.95**

*Introduced: June 1989  
Latest release: June 1992*

**FastFonts 3.0, \$99.95**

*Introduced: June 1992*  
Atech Software  
5964 La Place Court, Suite 125  
Carlsbad, CA 92008  
(619) 438-6883  
fax: (619) 438-6898  
**Circle 1336 on Inquiry Card.**

A font management utility, Publisher's PowerPak can scale fonts from 6-point type to 1000-point on-the-fly while presenting smoother on-screen images. The package supports more than 450 printers. Fast-Fonts 3.0 is an enhanced version of PowerPak that adds special-effects editing, scalable clip art, expanded type selection, and a font metrics editor.

**QAPLUS/WIN 5.0, \$159.95**

Introduced: Feb. 1992

Diagsoft, Inc.  
5615 Scotts Valley Dr., Suite 140  
Scotts Valley, CA 95066  
(800) 342-4763  
(408) 438-8247  
fax: (408) 438-7113  
**Circle 1337 on Inquiry Card.**

QAPLUS/WIN 5.0 tunes and troubleshoots Windows and DOS software and performs diagnostic tests on your system board, floppy drives, COM ports, mouse, add-in boards, hard drive, keyboard, printer, and LAN connections. It offers a disk performance test, DOS and Windows configuration data, on-line tuning help, a log file, and a report utility that outputs files in dBase IV format.

**Saber Menu System for Windows 2.0, \$89 (single user)**

Introduced: Feb. 1991  
Latest release: March 1992  
Supports DDE and OLE

Saber Software Corp.  
P.O. Box 9088  
Dallas, TX 75209  
(800) 338-8754  
(214) 361-8086  
fax: (214) 361-1882  
**Circle 1338 on Inquiry Card.**

The Saber Menu System for Windows 2.0 lets you create a consistent network front end for Windows and DOS clients. Menu creation features include

dynamic item configuration, dialog box prompting, and application key definitions. The software automatically creates and manages Windows PIF and INI files.

**SuperPrint 2.2, \$149**

Introduced: May 1990  
Latest release: May 1992

Zenographics, Inc.  
4 Executive Cir.  
Irvine, CA 92714  
(800) 366-7494  
(714) 851-6352  
fax: (714) 851-1314  
**Circle 1339 on Inquiry Card.**

The SuperPrint 2.2 printing utility provides enhancements such as on-the-fly font scaling, print queuing, background printing, and print acceleration. The software supports TrueType and ATM, and it includes a CAS (Communicating Applications Specification)-compatible fax driver and color-correction capabilities.

**Windows Workstation 4.1, \$995 (10-user server license)**

Introduced: Nov. 1988  
Latest release: April 1992  
Supports DDE

Automated Design Systems, Inc.  
375 Northridge Rd., Suite 270  
Atlanta, GA 30350  
(800) 366-2552  
(404) 394-2552  
fax: (404) 394-2191  
**Circle 1340 on Inquiry Card.**

Windows Workstation 4.1 lets you create a centralized Windows environment for clients on LAN Manager, NetWare, or Vines LANs. You use a Program Manager replacement feature to create shared, server-based Windows group menus, to configure LAN printers, and to provide centralized Windows print-queue management. Windows Workstation lets you restrict network access by user or group and

add new functions to program groups or items with the Multi-Set script language.

**WinTools 1.0, \$149**

Introduced: Jan. 1992  
Supports DDE

Tool Technology Publishing  
1125 A St., Suite 107  
San Rafael, CA 94901  
(415) 459-3700  
fax: (415) 459-1079  
**Circle 1341 on Inquiry Card.**

WinTools 1.0 is a shell program and customization system that replaces Windows' Program Manager, Task Manager, and File Manager. The program provides training icons for hierarchical launching, drag-and-drop operation, file system and desktop integration, and customizable network security. WinTools also includes a component called

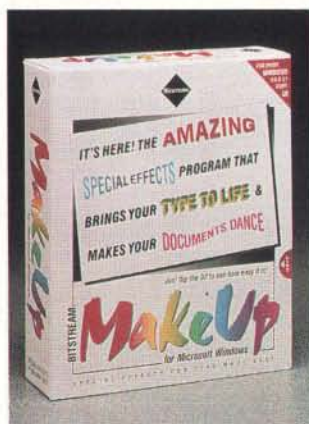
Big Sky that provides 16 virtual screens, each of which may hold a program, and the Image Librarian, which contains more than 100 images. (See "Four Windows Desktops" in this issue, and "Software in a Supporting Role," February BYTE.)

**XTree Gold for Windows 1.0, \$99**

Introduced: June 1992

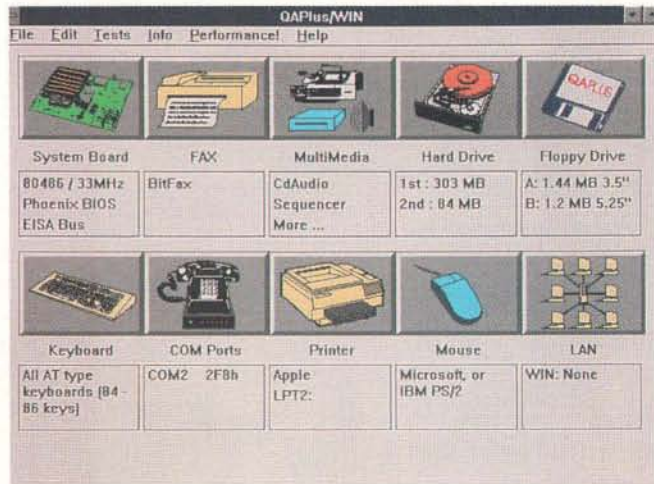
XTree Co.  
4330 Santa Fe Rd.  
San Luis Obispo, CA 93401  
(805) 541-0604  
fax: (805) 541-8053  
**Circle 1342 on Inquiry Card.**

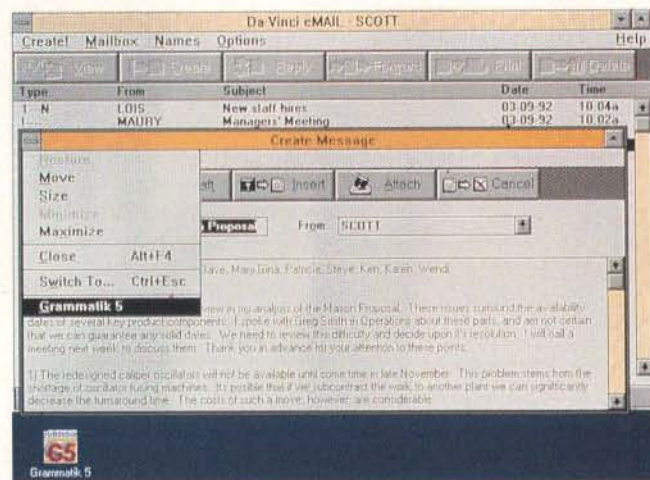
XTree Gold for Windows 1.0 replaces the Windows File Manager and adds a file viewer that supports more than 50 file types. The software provides windows that automatically



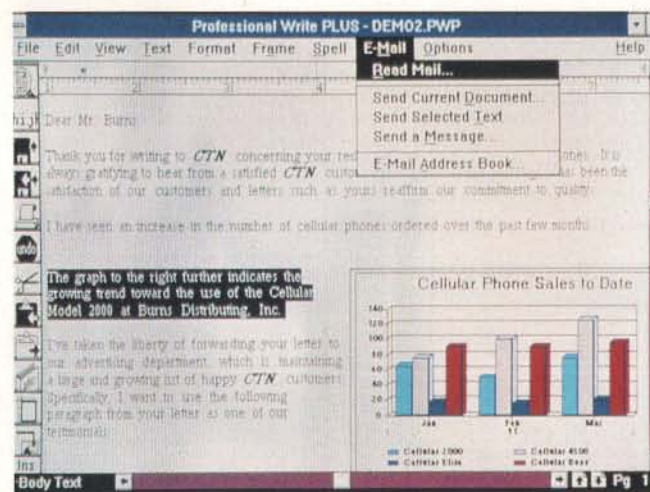
**Bitstream MakeUp 1.01, Bitstream**

**QAPLUS/WIN 5.0, Diagsoft**





**Grammatik 5 for Windows, Reference Software International**



**Professional Write Plus 1.0, Software Publishing**

resize themselves to prevent overlapping and a drag-and-drop interface that simplifies the creation of compressed PKZip files. XTree Gold for Windows stores the directory structure in memory for fast file searches and can work on shared volumes on a LAN.

**ZyIndex 5.0, \$395**

*Introduced: June 1991  
Latest release: June 1992*

ZyLab, a division of Information Dimensions, Inc. 100 Lexington Dr. Buffalo Grove, IL 60089 (800) 544-6339 (708) 459-8000 fax: (708) 459-8054

**Circle 1343 on Inquiry Card.**

ZyIndex 5.0 helps you search for, retrieve, and index files across network drives, local hard drives, CD-ROMs, and removable media. You can view word processing documents, graphics, or dBase files and search for a single word or phrase. ZyIndex also lets you use Boolean logic, proximity searches, prefix and suffix wild cards, conceptual searches by topic, field searches, and even searches by synonyms. (See "Searching for Common Threads," June BYTE.)

**WORD PROCESSING / WRITING TOOLS**

**Ami Pro 3.0, \$495**

*Introduced: March 1989  
Latest release: July 1992  
Supports DDE and OLE*

Lotus Development Corp. Word Processing Division 1000 Abernathy Rd. NE Building 400, Suite 1700 Atlanta, GA 30328 (800) 831-9679 (404) 391-0011 fax: (404) 698-7653

**Circle 1344 on Inquiry Card.**

A WYSIWYG word processor with graphics and page-layout capabilities, Ami Pro 3.0 features fast formatting, a document viewer, image enhancement, drag-and-drop operation, smart icons, a macro language, the SmartMerge mail-merge tool, and envelope and label printing. Ami Pro 3.0 comes bundled with the Adobe Type Manager font management program, and it supports Windows MDI (multiple document interface). (See "Writing in Style," June BYTE.)

**DeScribe Word Processor 3.0, \$495**

*Introduced: Oct. 1991  
Supports DDE*

DeScribe, Inc. 4047 North Freeway Blvd. Sacramento, CA 95834 (916) 646-1111 fax: (916) 923-3447

**Circle 1345 on Inquiry Card.**

The DeScribe Word Processor 3.0 combines WYSIWYG word processing, drawing, and desktop publishing tools. You can control fonts, point size, leading, and kerning on-screen and zoom from 10 percent to 500 percent. Text tools and a graphics ruler instantly reformat copy, and built-in drawing tools simplify incorporating and modifying graphics, charts, and logos. Additional features include tables, sorting, mail

merge, indexing, and the ability to undo multiple operations. (See "Writing in Style," June BYTE.)

**Grammatik 5 for Windows, \$99**

*Introduced: June 1986  
Latest release: April 1992*

Reference Software International 330 Townsend St., Suite 123 San Francisco, CA 94107 (800) 872-9933 (415) 541-0222 fax: (415) 541-0509

**Circle 1346 on Inquiry Card.**

With Grammatik 5 for Windows, you can proofread text in any Windows word processing document via the Clipboard. The software detects errors in grammar, style, usage, punctuation, and spelling; explains the problem; and makes suggestions for changes where appropriate. Grammatik 5 for Windows analyzes and compares documents for readability, and you can train it to recognize different styles. (See "Can a Grammar and Style Checker Improve Your Writing?," August 1991 BYTE.)

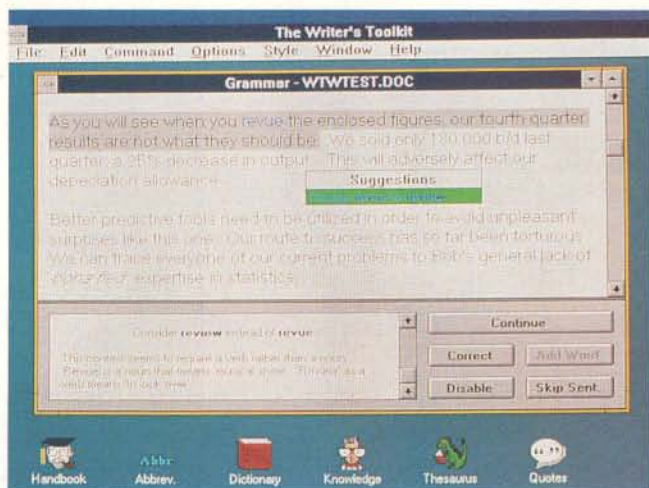
**Lotus Write 2.0 for Windows, \$199**

*Introduced: Feb. 1992  
Supports DDE and OLE*

Lotus Development Corp. Word Processing Division 1000 Abernathy Rd. NE Building 400, Suite 1700 Atlanta, GA 30328 (800) 831-9679 (404) 391-0011 fax: (404) 698-7653

**Circle 1347 on Inquiry Card.**

Actually a trimmed-down version of Ami Pro, Lotus Write 2.0 for Windows is an entry-level WYSIWYG word processor with features such as



**The Writer's Toolkit for Windows 2.0, Systems Compatibility**

smart icons, a thesaurus, a 130,000-word spelling checker, an outliner, automatic bullets, mail-merge notes and footnotes, and interactive dialog boxes. The software also includes tools for creating frame shadows and rounded corners, the ATM font manager, and support for the Windows MDI. (See "Looking Good for Less.")

**Microsoft Word for Windows 2.0, \$495**

*Introduced: Dec. 1989  
Latest release: Oct. 1991  
Supports DDE and OLE*

Microsoft Corp.  
1 Microsoft Way  
Redmond, WA 98052  
(800) 426-9400  
(206) 882-8080  
fax: (206) 936-7329

**Circle 1348 on Inquiry Card.**

**M**icrosoft Word for Windows 2.0 is a kitchen-sink WYSIWYG word processor with page-layout capabilities that let you easily create columns, borders and shading, drawings, charts, and tables. Features include drag-and-drop text, an outliner, drawing and graphing

tools, an envelope generator, a print-merge function, bullets, a grammar checker, a dictionary, an equation editor, and a graphical file finder. (See "Writing in Style," June BYTE.)

**Professional Write Plus 1.0, \$249**

*Introduced: March 1991  
Supports DDE*

Software Publishing Corp.  
3165 Kifer Rd.  
Santa Clara, CA 95051  
(408) 986-8000

**Circle 1349 on Inquiry Card.**

**A** WYSIWYG word processor, Professional Write Plus 1.0 includes page-layout functions, a customizable icon bar, predefined document templates, an E-mail front end that works with any MHS (message handling service)-compatible E-mail system, the Grammatik for Windows grammar checker, a thesaurus, and a spelling checker. (See "Looking Good for Less" in this issue, and "Writing in Style," June BYTE.)

**RightWriter for Windows, \$99.95**

*Introduced: Nov. 1991  
Supports DDE*

Que Software  
11711 North College Ave.  
Carmel, IN 46032

(800) 992-0244  
(317) 573-2500  
fax: (317) 573-2655

**Circle 1350 on Inquiry Card.**

**T**he RightWriter for Windows grammar and style checker proofreads your Windows documents for grammar, style, usage, and punctuation errors by way of the Clipboard. It also reads most word processor file formats, including the RTF (Rich Text File) format. When you run RightWriter against selected text, it automatically re-analyzes updated sentences as you make changes. (See "Can a Grammar and Style Checker Improve Your Writing?," August 1991 BYTE.)

**The Writer's Toolkit for Windows 2.0, \$129**

*Introduced: Nov. 1991  
Latest release: Feb. 1992  
Supports DDE*

Systems Compatibility Corp.  
401 North Wabash Ave.,  
Suite 600  
Chicago, IL 60611  
(800) 333-1395  
(312) 329-0700  
fax: (312) 670-0820

**Circle 1351 on Inquiry Card.**

**T**he Writer's Toolkit for Windows 2.0 is a complete resource for writers. This comprehensive word processor companion offers the Houghton-Mifflin CorrectText Grammar and Style Checker, the American Heritage Electronic Dictionary, the Concise Columbia Dictionary of Quotations, Roget's II Electronic Thesaurus, the Houghton-Mifflin Abbreviation Program, The Written Word III—Principles of Grammar and Style, and The Dictionary of Common Knowledge.

**WordPerfect 5.1 for Windows, \$495**

*Introduced: Nov. 1991  
Latest release: May 1992  
Supports DDE*

WordPerfect Corp.  
1555 North Technology Way  
Orem, Utah 84057  
(800) 451-5151  
(801) 225-5000  
fax: (801) 228-5077

**Circle 1352 on Inquiry Card.**

**T**he Windows version of WordPerfect 5.1 combines page-layout, graphics, and text capabilities. The package includes a customizable button bar, an equation editor, a spelling checker, a thesaurus, and a file manager/viewer. WordPerfect 5.1 for Windows also features drag-and-drop operation, macros, and file compatibility with the DOS version of WordPerfect. (See "WordPerfect for Windows," March BYTE.)

**WordStar for Windows 1.5, \$119**

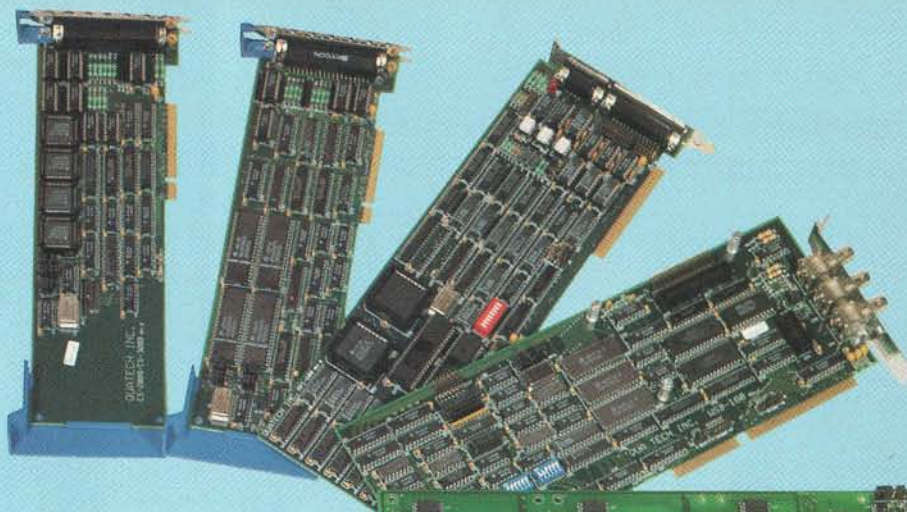
*Introduced: Sept. 1991  
Latest release: June 1992  
Supports DDE and OLE*

WordStar International, Inc.  
201 Alameda Del Prado  
Novato, CA 94949  
(800) 227-5609  
(415) 382-8000  
fax: (415) 883-1629

**Circle 1353 on Inquiry Card.**

**A** high-end WYSIWYG word processor with desktop publishing functions, WordStar for Windows 1.5 includes features such as a button bar and toolbox with drawing tools; drag-and-drop operation; table generation; predefined page-layout templates; 14 graphics file filters; and an on-line interactive tutorial. The word processor comes bundled with Correct Grammar 2.0 (a grammar, spelling, and style checker) and the Correct Writing for Windows style guide. (See "Writing in Style," June BYTE.) ■

# WHEN YOU NEED SOLUTIONS, NOT JUST ANOTHER BOARD!



Let a Quatech Sales Engineer show you the value of quality, service and support.

## COMMUNICATION

Quatech produces a full line of serial and parallel adapters for PS/2, PC-XT, AT and compatible systems available in RS-232, RS-422, RS-485 and Current Loop. Selectable addresses and interrupt capabilities are featured in our multi-port/user, SDLC, HDLC, and X.25 adapters. Software and 16550 UARTS are available.

## DATA ACQUISITION

Quatech has developed a full line of data acquisition products for the IBM AT and compatibles. These high performance, low cost boards provide analog-to-digital, digital-to-analog, and digital input/output functions. A/D and D/A converters are equipped with 8, 12, or 16 bit resolution, and sampling rates up to 1 MHz.

# 1-800-553-1170



Corporate office: (216) 434-3154, FAX (216) 434-1409, 662 Wolf Ledges Pkwy, Akron, OH 44311 U.S.A. International: Australia/Interworld Electronics 03-563-7066, Canada (Western)/Interworld VCR 604-984-4171, England/Diamond Point International 634-722-390, Finland/Lab Hitech OY 358-0-804-2522, France/Elexo 33-1-69302880, Germany/Jupiter Electronic Systems 06181/75041, Israel/RCM Ltd. 972-03-5447885, Italy/N.C.S. Computer Italia 0331/770-016, Netherlands/ACAL Auriema 040-816565 Korea/Sam Boo Enterprise Co. 02-678-7457. IBM PC-XT, AT and PS/2 are registered trademarks of IBM Corp.



Made  
in  
U.S.A.

# Buy it Through

# BYTE

## BUYER'S GUIDE

### Mail Order

The latest offerings from vendors supplying products of all leading manufacturers at extremely competitive prices.

154

### Hardware/Software Showcase

This *categorized* four-color display section makes it easy to find Hardware and Software products from a wide variety of manufacturers and suppliers.

163

### Buyer's Mart

From Accessories to Laptops to Word Processors, you can easily find the dealers you are looking for in this directory of products and services.

167



After 9 years, We're Still Doggedly Determined to Give the Best Doggone Service and Prices to PC Users!

**1-800-438-6039**

## Network

<b>3COM</b>	
3C503 Etherlink II/ 5-pack	189/799
3C503TP 10 Base T	229
3C505B Ethernet Plus	579
3C507 Etherlink 16	279
3C523 MCA Ethernet	269
<b>ARTISGIFT</b>	
Starter Kit 2mbps/AE2	325/459
Starter KitAE3	539
Lan Cards 2mbps/AE2	129/199
Lan Card AE3	229
Central Station	419
<b>NOVELL</b>	
Novell Lite 1.0/starter kit	69/399
Netware 2.2 5/10 User	479/1099
Netware V.2.2-5.0 user	1899
Netware 3.11 20/100 User	1899/3648
Netware 3.11-10 User	1375
NE1000/NE2000	129/155
NE 3200	669
Access Server	1595
<b>SMC</b>	
PC130/PC130E	75/99
PC600WS/PC600FS	129/209
HUB 8-Active/4-Passive	249/69
Ethercard 8 bit/16 bit	149/169
Token Card 8 bit/16 bit	349/399
10 Base-T Card 8 bit/16 bit	185/205
3603TP 10BT concentrator	409
3106 16 bit Etherlink 10BT coax	159
3512TP Ether.10BT conc.12 port	709
<b>THOMAS CONRAD</b>	
TC4045 16/4 Token Ring	499
TC6151-11 16 port smart hub	679
TC6242/TC6242-TP+	69/99
TC6245/TC6245-TP+	199/219
TC6045/TC6045-TP+	199/219

## Network Software

Borland D Base IV LAN-1 user	249
Borland Quatro Pro V.4.0 ntwkable	319
Close-Up Lan Zuser/8 user	249/479
Foxpro Lan 8 user	539
Lotus 2.4 server/node	559/339
Lotus 3.1 server/node	625/409
Norton PC Anywhere V.4.5	119
Norton PC Anywhere V.4.5 Lan	325
Peachtree Network Accounting	489
Procomm Plus Network 5 pack	325
Unouchable Network	429
Word Perfect Office- 5 user	289
Wordstar 2000 LAN-3 pack	259
X Tree Virus Safe Lan	379
X Tree Net/ for Unix	319/189

## Software

Aldus Pagemaker	499
Carbon Copy/Close Up	110/109
Clarian ProDeveloper	449
Clipper 5.0	489
Corel Draw	365
Dbase IV 1.5	389
Desqview 386	129
Foxbase/FoxPro	195/449
Freelance Plus	309
Harvard Graphics	359
Lotus 2.4/3.1 Plus	345/379
Lotus Symphony	469
Lotus for Windows	415
Smart Suite/Upgrade	449/339
Microsoft Windows 3.1/Word	89/219
Microsoft Word for Windows	299
Microsoft Excel for Windows	319
Norton Desktop for Windows	94
Norton Utilities 6.0	115
Norton AntiVirus	85
Peachtree III Complete DQ	189
Paradox call	219
Q&A 4.0	299
Quattro Pro	299
Ventura Desktop Publishing	479
Word Perfect 5.1	255
Word Perfect for Windows	259
Wordstar 7.0/2000+	259/225

## Chips

INTEL 387-33	95
387-SX16/20	89
CYRIX SX16/20/25	77
SX33	95
DX33/40	95/125

## Notebooks

<b>TEXAS INSTRUMENTS</b>	
3000-60/80/120	2025/2195/2589
3000 Win SX-60/80	1995/2339
3000 Win SX/120	2699
<b>TM4000 Win* 4MB</b>	
SX/16 w/ 80MB HD	2495
SX/25 w/ 120MB HD	2999
DX/25 w/ 120MB HD	3325
<b>LIBREX</b>	
SX/20 + 4 MB w/40HD	1250
SX/20 + 4 MB w/60HD	1325
SX/20 + 4 MB w/80HD	1450
<b>AST 386SX-20</b>	
43V + w/ 40MB *2MB	1995
63V + w/ 60MB *2MB	2299
<b>NEC</b>	
Ultralite SX20 w/ 60	2539
Ultralite SX10 w/ 80	2599
Ultralite SX25 color w/ 80	4999
<b>EPSON</b>	
NBSL-20/25	1525/1775
w/ 60/80/120 MB HD	389/542/756

## Monitors

<b>NEC MULTISYNC</b>	
3FGX/4FG	689/769
<b>PANASONIC</b>	
1381/1395	329/439
1991-20"1280x1024	1559
<b>SAMSUNG</b>	
Flat White ML4571	119
CVB 4995 Syncmaster 2E	269
CVM 4967 Syncmaster 3E	299
<b>CTX</b>	
5468/5468NI	289/329
3436 Multiscan 28	399
1760 17" VGA.28	815
5439/5432	229/275
<b>NANAO</b>	
9070U/9080i	869/1025
5501/5601	1149/1899
<b>VIEWSONIC</b>	
7/6/6SF	1069/369/629

## Video Cards

<b>ATI</b>	
VGA Integra 512K	89
Graphics Vantage 1mb	349
Graphics Ultra w/ 1MB	459
8514 Ultra Plus w/ 1MB	389
VGA Wonder XL w/ 1mb	189
<b>BOCA</b>	
Basic VGA/Super VGA	63/129
<b>CARDINAL</b>	
VGA 700/732 w/1MB	119/139
900 w/ 1mb/7000	225/169
<b>ORCHID</b>	
Prodesigner II w/ 1 mb	185
Fahrenheit 1280 degree with 1 MB...	289
<b>VIDEO SEVEN</b>	
1024i Plus w/ 512	95
V RAM II 1 mb	289
Win. VGA w/ 1 mb	159

## Modems & Fax

<b>CARDINAL</b>	
2400 INT/EXT	62/84
2400 INT/EXT w/MNP	69/99
9600 INT/EXT	249/279
96/24 Fax modem INT	89
<b>HAYES</b>	
Ultra 1.44 V.32	679
Ultra 9600 ext.	599
Optima 9600 V.32	349
<b>HEWLET-PACKARD</b>	
Plain Paper Fax 200/310	999/1399
<b>INTEL</b>	
Satisfaction Modem 200/400	309/409
<b>PRACTICAL PERIPHERALS</b>	
9600 V.42 Int/Ext	269/279
1.44FX fax/modem Int/Ext	350/389
<b>US ROBOTICS</b>	
16.8 HST ext. w/ ASL	569
Dual 16.8 HST ext	799
Shared Access Kit	649
<b>ZOOM</b>	
FC 9624	99

## Printers

<b>CANON</b>	
LPB4+LBP8+	919/1499
BJ20	399
BJ 300/330	469/599
<b>DICOMIX</b>	
180si/701	299/439
<b>EPSON</b>	
LX810/AP 3250	155/219
FX850/FX1050	289/379
LQ570/LQ670	269/435
LQ1070/LQ1170	375/579
LQ2550	849
EPL8000/7500	1295/call
DFX5000/8000	1269/2139
<b>HEWLETT-PACKARD</b>	
Laser Series III/IIID	1549/2599
Laser IIP/IIIP	869/1069
Desk Jet 500/500c	399/759
<b>IBM Laser</b>	
6/6P	1479/1825
10/10P	1749/2899
<b>NEC</b>	
Silentwriter 95	1469
<b>OKIDATA</b>	
184/380	229/219
320+/390+	314/439
321+/391+	435/595
393+/393C+	919/999
400/800 LASER	599/925
810/820 LASER	1064/1249
830/840 LASER	1269/1569
3410	1299
<b>PANASONIC</b>	
1123/1124i	199/275
1624/1654	339/539
2180/2123	175/255
1695/2624	369/379
4410/4450i	649/1079
4430/4455	909/1719
<b>QMS</b>	
PS 410/815	1529/2949
Color Script 100 model 10p	4699
<b>LASER ACCESSORIES</b>	
Upgrade for HP III 1 mb	79
Upgrade- HP III 2mb/4mb	109/179
Pacific Data 25-N-1	249
Pacific Page PE/PEXL	269/649
Pacific Connect 256K	249
Complete Font Library	249
Font Bank Cartridge 1.5 Mb	269

## Memory Boards

<b>AST</b>	
Six Pack+ w/384K XT	129
Six Pack286 w/OK AT	95
Rampage PC w/ 1 mb	285
<b>ORCHID</b>	
Ramquest 16/32 w/OK PS/2	199
Ramquest 8/16 w/OK XT/AT	129
<b>ACCELERATOR BOARDS</b>	
Orchid Tiny Turbo 286 Xtra	179

## Bulldog Systems

<b>Bulldog's Standard Configuration</b>	
Dual Floppy Drives + Super VGA Card with 1 Mb RAM + 14" Color VGA Monitor (1024 x 768) + DOS 5.0 + Windows 3.1 + Mouse + 1 year warranty!	
386-SX/25 w/ 2 MB w/ 80 MB HD	1249
386-33 (64K CACHE) 4MB , 130HD	
	\$1549
486-33 (256K CACHE)4MB, 213MB HD	\$2395
486-50 (256K CACHE)4MB, 213MB HD	\$2650
Call for other configurations	

## Drives

<b>CONNER</b>	
120 IDE 3.5/200IDE 3.5	349/549
<b>IOMEGA</b>	
90 MB Insider/Transportable	579/689
Dual 90 ext	1495
<b>MAGNA VOX</b>	
48IRS EXT CDW/ software	369
<b>MAXTOR</b>	
7120A 130 mg	369
7213 A 210 meg	589
<b>MICRO SOLUTIONS</b>	
Backpack Ext. Floppy 1.2/1.44	189
<b>NEC</b>	
CDR 84 Int/74 ext	509/549
CDR 37 portable	389
<b>QUANTUM PASSPORT XL removable</b>	
50MB/105MB	359/495
120MB/240MB	699/869
<b>SEAGATE</b>	
ST3096A 89 mb IDE	289
ST 3144A 120 IDE	379
<b>SYSGEN-Mobile Disk</b>	
40/80/120	399/569/649
<b>FLOPPY DRIVES</b>	
360K/1.2MB/1.44MB	59/59/59

## Tape Drives

<b>IRWIN</b>	
Accultrak 120/250	189/239
<b>COLORADO MEMORY SYSTEMS</b>	
DJ10 120 Meg Int Jumbo	199
DJ20 250 Meg Int Jumbo	259
Trakker 120	319
Trakker 250	439
QFA 700 Meg Int	719
<b>MICRO SOLUTIONS</b>	
40/120 Backpack	365
80/250 Backpack	429

## Mice & Misc.

Microsoft Mouse w/Windows 3.1	149
Microsoft Ball Point Mouse	118
Logitech Fotoman	525
Logitech Scan Man 256	269
Sound Blaster Pro	189

610 Industrial Park Drive  
Evans, Georgia 30809  
PO Box 211043, Martinez, GA 30907  
OPEN weekdays: 8:30 a.m. to 6:00 p.m.  
(706) 860-7364 • FAX (706) 860-7358



**BULLDOG**  
COMPUTER PRODUCTS

No charge for credit cards. Shipping and handling extra (minimum \$6). APO & FPO addresses add 10% (the rest pay the same). Product warranties, offers, and claims are handled by the manufacturer. DOAs repaired or replaced at our option during the first 90 days only. No returns on used items. All return shipments are subject to a 15% minimum restocking fee. Defective software replaced with same item only. Call 404-693-7364 for a Return Authorization number prior to returning any product. Shipping charges are non-refundable. Bulldog cannot guarantee compatibility. All prices are U.S. and are subject to change and availability. Currency markets add sales tax.



# Pick A Card

# Volante

Draw  
your  
winning  
card from  
National  
Design's

**Volante Series**  
of high speed graphics boards.



All Volante high speed graphics boards offer:

- Built on ISA, MicroChannel or VME bus
- Video memory upgrades to 4 MB
- Program memory upgrades to 4 MB
- Razor sharp resolutions from 1024x768 up to 1600x1280
- Blazing color selection from 8-bit to 24-bit true color
- Optional TI TMS34082 floating point processor for enhanced 3D acceleration
- Superior speed of the TI TMS34020 graphics engine paired with National Design's advanced ASIC technology
- LIFETIME WARRANTY - no gamble here!

Whether your game is CAD, Microsoft Windows, graphic arts, multi-media or medical imaging, Volante has a card for you at a fraction of the cost charged by the competition.

Call 800-253-8831 now for information  
on the breathtaking Volante series.

Phone: 512-329-5055 Fax: 512-326-6326

**NDI**

NATIONAL DESIGN, INC.  
1515 CAPITAL OF TEXAS HWY, SO.  
5TH FLOOR  
AUSTIN, TEXAS 78746

Circle 158 on Inquiry Card (RESELLERS: 159).

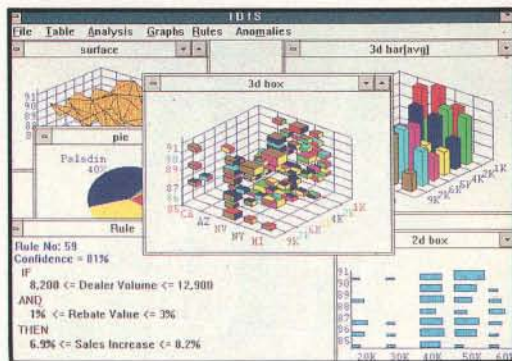
# Turn DATA into INFORMATION™



The Information Discovery System

**In Life, You Get Out  
What You Put In.  
With IDIS, You Get Out  
a Lot More!**

Automatically examines data with built-in analysis algorithms, then forms, tests, and modifies hypotheses. When patterns emerge, rules are generated. IDIS also detects unusual data items. It graphs databases with unique hypermedia zoom in/out capabilities.

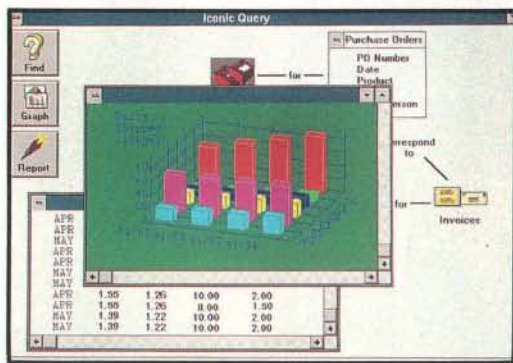


\$1900.00

**Iconic Query™**  
What You See is What You Ask

**Do It With Icons!  
Easy and Quick.**

Just point and click to query a database. Iconic Query is an immediately usable database access tool that employs representative pictures and visual scenes, instead of a query language or tables. Combines GUIs and Hypertext. Built-in 3D graphics.



\$290.00

**Call Now!**

**(800) 888-2996**

for additional information

**IntelligenceWare™**

5933 W. Century Blvd. Los Angeles, CA 90045  
Tel: 310-216-6177 Fax: 310-417-8897

## Computerworld

If you are a database user who blanches every time you wrestle with a convoluted SQL command, you may be in for a break.

## PC Week

Iconic Query is for people who want to build queries on their own with little or no knowledge of Structured Query Language.

## The Wall Street Journal

As databases become larger, the chance of errors goes up, our ability to deal with them goes down, because we haven't developed defense systems against anomalies and errors. One of the solutions is here!

Databases:  
PARADOX™  
dBASE™  
ORACLE™  
SYBASE™  
DB2™  
SQL-BASE™  
SQL-SERVER™  
and many others

Platforms:  
PC/Windows™  
SUN™  
VAX™  
IBM RS series™  
IBM Mainframes™

Trademarks are properties of their respective owners.

# THE BEST FOR LESS



High Resolution  
CAD and Windows



Multimedia  
Video for the PC

**THE LOWEST PRICES ANYWHERE ON...**

SEE US AT COMDEX  
BOOTH #B0343

High performance graphics for the PC. 1600 × 1280 resolution gives 6 times the visual information of standard VGA. Dedicated graphics processor handles graphics commands up to 100 times faster. All TEXANs are supplied with drivers for TIGA and MS-Windows, and a display list driver for AutoCAD® 386 rel. 10-12. × Window System for Interactive and SCO UNIX is optional. TI® TMS34020 processor, TMS34082 optional, VGA passthrough for single monitor operation, software selectable resolutions, 256 colors.

**THE TEXAN 1600**  
1600 × 1280 display resolution, 256 colors, 60Hz noninterlaced, VGA passthrough and cables. **\$1450.00**

**THE TEXAN 1280**  
1280 × 1024 display resolution, 256 colors, 72Hz noninterlaced, VGA passthrough and cables. **\$1250.00**

**THE TEXAN 1024/16**  
1024 × 768 display resolution, 16 colors, 72Hz noninterlaced, VGA passthrough and cables. **\$1150.00**  
**\$995.00**

**NEW M&M PRO** 24-bit true color NTSC/PAL/SECAM video window frame grabber. 12-bit digital stereo audio. Hardware compression. Outputs S-VGA and flicker-free NTSC/PAL S-Video/Composite. Single PC slot. Frame Grabber . . . **\$995.00** Call for other features.

**M&M Basic** Frame Grabber puts live video in a window on existing VGA display. NTSC and PAL.

Composite Video only . . . . . **\$500.00**  
S-Video and Composite . . . . . **\$700.00**  
~~\$800.00~~  
**\$600.00**

**VIVA** Video, VGA, and Audio mixer converts VGA to video, and outputs as an overlay on an input video signal.

NTSC Composite Video . . . . . **\$550.00**  
PAL Composite Video . . . . . **\$630.00**

**VIVA Basic** VGA to Video Converter outputs VGA to composite and S-Video with flicker-free filters.

NTSC Composite Video . . . . . **\$300.00**

**SWEET 16** Real-Time Frame Grabber displays 32K colors with full TARGA® 16 compatibility. S-Video and Composite . . . . . **\$775.00**

Monitors . . .

IDEK 21" flat screen monitors multiscan 30-80 KHz  
MF 5421A 1600x1280, .26 Dot Pitch **\$2525.00**  
MF 5221A 1280x1024, .31 Dot Pitch **\$2125.00**  
others available . . .

(PHONE) **713 464-2990**

(FAX) **713 827-7540**

WE ACCEPT VISA,  
MASTERCARD AND  
AMERICAN EXPRESS



Direct From  
Manufacturer  
12-Month  
Warranty  
E.O.B. Houston

**Omnicom**  
Graphics Corporation™

...The Texas Graphics Company  
1734 W. Sam Houston Pkwy. N.  
Houston, Texas 77043

Omnicom is a Houston based and owned manufacturer of high performance graphics hardware for popular computer platforms including PC/AT, VME, Micro Channel®, and others.

Omnicom, THE TEXAN, M&M PRO, M&M Basic, VIVA, VIVA Basic, and SWEET 16 are trademarks of Omnicomp Graphics Corporation. Windows and MS-Windows are trademarks of Microsoft Corporation. TI is a registered trademark and TMS34020, TMS34082, and TIGA are trademarks of Texas Instruments Incorporated. AutoCAD is a registered trademark of Autodesk, Inc. Interactive UNIX is a trademark of Interactive Systems Corporation. TARGA is a registered trademark of Truevision, Inc. Micro Channel is a registered trademark of International Business Machines Corporation. X Window System is a trademark of Massachusetts Institute of Technology.

Circle 200 on Inquiry Card (RESELLERS: 201).



For Windows 3.1 or NT, OS/2 2.0 & UNIX V Rel. 4

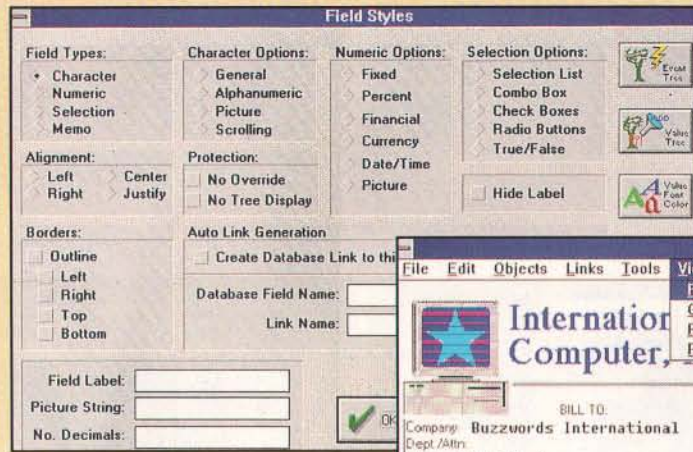
# Convert ObjectVision .OVD Apps to Source Code Or Create New Apps from Scratch

## THE EASIEST WAY TO CREATE GUI APPLICATIONS FOR BORLAND LANGUAGE PRODUCTS

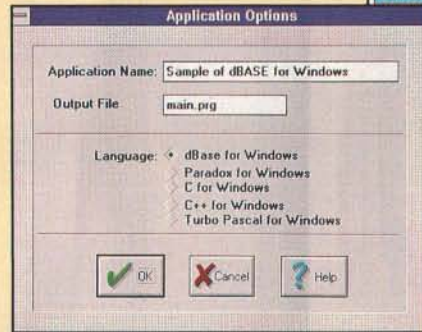
Create 16 or 32 bit GUI database applications in only minutes. The ultimate GUI Source Code generator for all Borland Language Products.

## IMAGINE THE BENEFITS

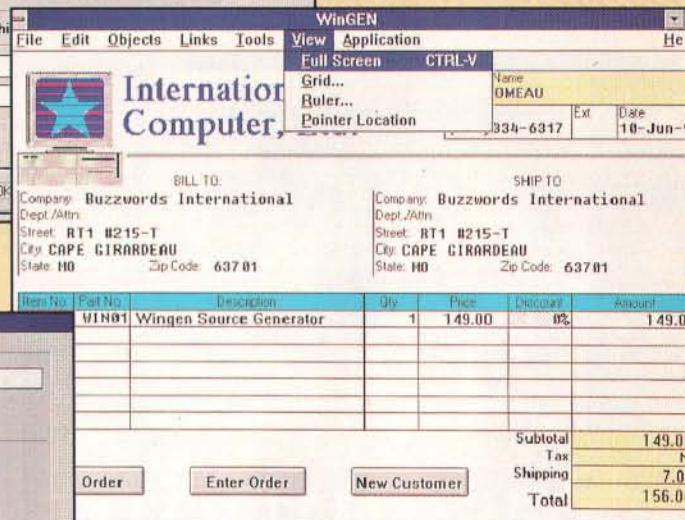
- Create Portable Source Code for Windows, OS/2 or UNIX- applications that are operating system independent.
- Convert existing ObjectVision .OVD files to Source Code.
- Build database GUI front ends easily.
- Connect new apps to your existing data quickly.
- Improve Programming Standardization practices.
- Fast development lets you incorporate end user quickly.
- Source Generation for Borland Language Family.
- Create royalty free apps.
- Screen capture any res.
- No ObjectVision title bar! Just your forms are displayed.
- Fully visual WYSIWYG screen designer or painter.
- Sample apps source included.
- DDE / DDEML / OLE support.
- Run apps at compiled speed not interpreted speed.
- Object oriented source code generation.



Create new applications with WinGEN™ extensive design tools.



Create applications for the Borland Family of Languages.



Familiar ObjectVision Interpreted forms can be migrated to High Speed Borland Compiled languages.

## INSTANT APPLICATIONS

You can convert any existing OBJECTVISION application to source. New programs can also be created by simply drawing your interface, add your logic using *Decision Trees*, and connect to the data base of your choice using one of the BORLAND Language Products.

## DRAW YOUR USER INTERFACE

Creating new applications with WinGEN™ is easy using the WYSIWYG designer. Portable Object Oriented programming is taken to new heights with the advanced Object

## BUSINESS LOGIC CONNECTIVITY

Apply you own business logic using easy to understand Graphical Decision tree Logic. Calculate field value specify actions, or run other applications.

## WinGEN™ IS FOR DEVELOPERS

Programmers can take full advantage of their language's potential. Create operating system independent applications. Programs can execute Interpretive ObjectVision style of app using High Speed Borland Compiled Languages for the ultimate in GUI performance.

### WinGEN™ Supports:

- dBase for Windows
- C for Windows
- CPP for Windows
- Turbo Pascal for Windows
- Paradox Engine

**WinGEN™ WYSIWYG Screen Designer**  
or  
**WinGEN™ DBMS App Designer**



Rt. 1 Box 215-T  
Cape Girardeau, MO 63701  
314-334-6317 • FAX 314-334-0794

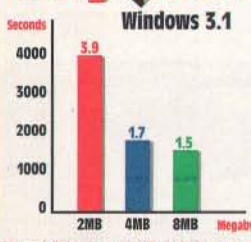
Circle 155 on Inquiry Card.

# MEMORY AND MORE...

Open Saturday

**COMPATIBILITY**  
**100%**  
**GUARANTEED**  
OR YOUR MONEY BACK!

## Why add more memory?



- An upgrade from 2MB to 8MB can increase performance up to 160%
- Memory allows Windows to run faster
- Reduces your system's need to access the hard disk
- Speeds up programs which use virtual memory
- Allows you to utilize numerous and extensive applications at the same time

\*This graph displays the amount of time it takes to run one specific Windows application with the indicated amount of memory.

## Kingston TECHNOLOGY CORPORATION

Turn your 286 into a 386 with the SX/Now!

For Windows enhanced mode, true multitasking, background operation for Windows 3.1, OS/2, and 386 software. SX/Now! includes a Math coprocessor socket, 8KB cache and improves performance by up to 350%.

- SX/Now! is now available for:**
- ✓ HP ES286/12 & ES/8
  - ✓ Epson Equity IIe & Epson Equity IIPlus
  - ✓ IBM Original AT and XT/286
  - ✓ AGI 1800A, B, C
  - ✓ AST Premium 286 and Bravo 286
  - ✓ Compaq Portable III and DeskPro286
  - ✓ NEC PowerMate 286 Plus and Portable Plus
  - ✓ IBM PS/2 25/286, 30286, 50, 50Z, 60



"Kingston Technology Corp.'s SX/Now! is the undisputed performance champ."  
-PC Magazine, Oct 29, 1991

- 20MHz SX/Now! ..... \$309
- 25MHz SX/Now! ..... \$359
- 33MHz SX/Now! ..... \$399

## Personal Computer Memory

### IBM

PS/1 286, 386SX	92F9555	\$99
2MB		
PS/2 50/286, Expansion board 1497259	30F5360	\$99
2MB Kit		
PS/2 55SX; 1S, 40SX, 50Z, 55SX; 1S, 65SX; 1S, 70		
1MB 6450603	551 2MB 6450604	\$89
PS/2 70-424; A61; B24; B61		
2MB	6450608	\$95
PS/2 55SX; 1S, 40SX, 55SX; 1S, 65SX; 1S, 34F300X		
4MB	34F2853 or 07F9977	\$169
PS/2 55SX; 1S, 40SX		
8MB	6450129	\$349
PS/2 90, 95, AND P75 (Install in pairs)		
4MB 6450128	\$169 8MB 6450130	\$349
Expansion boards for 50, 50Z, 55SX, 60, 65SX		
2-8MB with 2M	1497259	\$269
2-16MB with 2M	6450609	\$319
Expansion boards for all models 70 and 80		
2-14MB with 2M	34F5077	\$329

### Zenith

Zenith Z-386/20; Z5; S3 and S3E		
1MB ZA3800ME	\$59 4MB ZA3800MK	\$179
Zenith Z-386SX, 286PL+, Z-1S		
2MB Kit	Z-60S-1	\$99
Zenith 486/336E; Z5E		
4MB ZA200M2	\$209 16MB ZA200MB	\$699

### Hewlett-Packard

Vectra OS/16S; 20PC, 35/20PC; 25PC, 20C		
4MB Kit	D1542A or D1642A	\$179
Vectra 386/16N, 386/20H		
2MB D2406A	\$109 8MB D2404A	\$329
Vectra 486 PC (Install in pairs)		
8MB D2152A	\$359 4MB D2151A	\$179
Vectra 386/25, 486/25T, 35T (Install in pairs)		
2MB D2591A		\$99

### NEC

Powermate 286/12; SX/16 and SX/20		
2MB Kit	OP-410-8103	\$99
Powermate 386/20; Z5		
2MB APC-H655	\$359 8MB APC-H656	\$899
Powermate 386/33E and 486/25E		
2MB	OP-410-5101	\$219

### AST

Bravo 386-SX, WS/286, 386		
2MB 500510-002	\$89 4MB 500510-008	\$179
Premium 386/25; S3; S3T, Premium II 386SX/16; 20		
1MB w/WPB	500780-003; 002	\$69
Bravo 4/33; 486/25; Premium II; TE; Server SE 4/33		
2MB w/WPB	500718-004; 780-005	\$129
Premium II (All), Premium 386/33T and 386SX/16		
4MB w/WPB	500780-004	\$169
All Premium 386/33T, 486/33T, Server SE 4/33, Bravo 486		
8MB w/WPB	500780-001	\$339

Please call for any upgrade not listed.

### Compaq

ProLinea 3/25; Z5		
2MB 141739-001	\$90 8MB 141742-001	\$285
DeskPro 386-20, 20E and Z5		
4MB Module	115132-001	\$179
4MB Board	115645-001	\$249
DeskPro 386S/16		
4MB Module	112534-001	\$179
4MB Board	115634-001	\$259
DeskPro 286N, 386N, 386SX/20, 386/25M, 486/33M, 486/425M, 486/416M, SystemPro LT, 486SX/25S; 386/25S; Portable 486C;		
1MB 118684-001	\$59 2MB 118689-001	\$99
4MB 118690-001	\$169 8MB 112877-001	\$399
DeskPro 386-35, 486-35, and SystemPro		
2MB 115144-001	\$119 8MB 116581-001	\$529
DeskPro 386M, 486M, SystemPro LT (52-Bit Exp. board)		
2-64MB w/2M	129160-001	\$379

## Laptop & Notebook Memory

### AST

Premium Exec Notebook	1MB ..... \$69
	4MB ..... \$169

### Compaq

Contura 3/20 and 3/25	4MB ..... \$199
	8MB ..... \$519
LTE 286 Notebook	2MB ..... \$129
	4MB ..... \$199
LTE 386S/20 Notebook	1MB ..... \$99
	4MB ..... \$249
LTE Lite 20; 25 Notebook	2MB ..... \$199
	4MB ..... \$289
SLT 386 Notebook	1MB ..... \$89
	4MB ..... \$249

### Dell

HL20 and HL25 Notebook	2MB ..... \$159
212N and S20N Laptop	1MB ..... \$109
	2MB ..... \$159

### Everex

Tempo LX Notebook	2MB ..... \$109
Tempo Carrier Notebook	2MB ..... \$179

### IBM

CL57SX Color Notebook	4MB ..... \$549
	8MB ..... \$669
H51 Notebook (All)	2MB ..... \$179
	4MB ..... \$249
L40SX and H33SX Notebook	4MB ..... \$159
L40SX	8MB ..... \$339

### NEC

UltraLite III, SL/25C	2MB ..... \$199
	4MB ..... \$449
UltraLite SL/20, SL/20P	2MB ..... \$219
	4MB ..... \$519
ProSpeed 286, 386SX-16	1MB ..... \$199
	4MB ..... \$339
ProSpeed 386	2MB ..... \$159
	8MB ..... \$699

### Texas Instruments

TravelMate 2000	1MB ..... \$119
TravelMate 5000, WinSX	2MB ..... \$99

### Toshiba

T1000SE; LE; XE; 2000SX; SXe; 2200SX	2MB ..... \$119
	4MB ..... \$219
	8MB ..... \$399
T1200XE, 1600, and 3100E	2MB ..... \$99
T3100SX, 3200SX, and SXIC Portables	2MB ..... \$99
	4MB ..... \$169
T3200	5MB ..... \$159
T3300SL Notebook	2MB ..... \$179
	4MB ..... \$329
T4400 and T6400, SX, SXIC Notebook	2MB ..... \$209
	4MB ..... \$309
	8MB ..... \$649
	2MB ..... \$109
	2MB ..... \$109
	8MB ..... \$359

### Zenith

Z-Note Notebook	2MB ..... \$169
	8MB ..... \$359
MastersPort 386SL, SLIC, Sle	2MB ..... \$129
MastersPort 386SX	2MB ..... \$129
SupersPort SX; 286E; SlimsPort	2MB ..... \$139
SupersPort 286; 286E	1MB ..... \$109
SupersPort 286E; SlimsPort	4MB ..... \$299
TurboPort 586; 386E	1MB ..... \$89

### Other Upgrades

Grid 1450sx	2MB ..... \$189
Grid 1500 Series	4MB ..... \$259
Panasonic CF170, CF270, CF370	1MB ..... \$69
Sanyo and Zetec Notebook Memory	2MB ..... \$109
Nagavox 286 and 386SX Notebook	1MB ..... \$109
	4MB ..... \$269
Packard Bell 286 and 386SX Notebook	1MB ..... \$109
	4MB ..... \$269
Sharp 6220 Notebook	1MB ..... \$119

## Laser Printer Memory

Hewlett-Packard LaserJet IIP, III, IIP, IID		
2MB 35475B	\$115 4MB 35477B	\$179
Hewlett-Packard LaserJet II and IID		
2MB 35444B	\$115 4MB 35445B	\$179
Hewlett-Packard LaserJet IIISI		
1MB C2065A	\$59 4MB C2065A	\$159
Hewlett-Packard DeskJet 500, 500C		
256K	227078	\$69
IBM Laser 4029 All Models		
2MB 1183334	\$129 4MB 1183335	\$189
Canon LBP-4		
1MB S63-2230	\$169 2MB PH N/A	\$229
Canon LBP-III and III Plus		
2MB S63-2550	\$240 5MB S63-2560	\$299
Brother HL-8, 8E, 8D, 8V		
1MB MB-810	\$149 2MB MB-820	\$199
Panasonic 4410 and 4430		
2MB KX-P441	\$129 4MB PH N/A	\$209
Panasonic 44501 and 4420		
2MB KX-P441	\$129 4MB PH N/A	\$209
OKiLaser 400		
1MB 70014701	\$99 2MB OKI PH N/A	\$129
Texas Instruments MicroLaser and XL		
1MB 2555759-0001		\$59
Epson EPL 6000		
2MB IBS401	\$119 4MB PH N/A	\$189
Epson ActionLaser II, EPL-8000		
2MB PH N/A	\$169 4MB PH N/A	\$259

## BOCA RESEARCH INC.

### Expansion Boards

Bocazam XT 512K-2MB for XT and PS/2 25 and 30 machines. Provides LIM 4.0 expanded memory only.		
w/512K	\$129 w/1.5MB	\$195
w/1MB	\$162 w/2MB	\$229
Bocazam AT Plus 2-8MB memory board for 80286 & 80386 IBM compatible machines running up to 33MHz. Get conventional, expanded (LIM EMS 4.0) and/or extended memory, supports OS/2.		
w/2MB	\$189 w/6MB	\$299
w/4MB	\$249 w/8MB	\$379
Bocazam AT I/O Plus 2-4MB memory board, same as AT Plus with 1 serial and 1 parallel port. Uses 1M x 1 DRAM chips.		
w/2MB	\$199 w/4MB	\$279

### Video Cards

Boca Research		
Basic VGA 640x480 16 color		\$69
Super VGA 512k 1024x768 16 color		\$119
Super X-VGA 1MB 1024x768 256 color		\$159
Diamond Computer		
Stealth V-RAM High-Color SVGA 1MB		\$265
SpeedSTAR 24X True Color Card		\$199

**FIRST SOURCE WILL GIVE YOU GREAT QUALITY, PRICE, SERVICE, AND SUPPORT.**

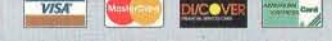
- ◆ 30 Day Money Back Guarantee!
- ◆ Installation instructions included with all products
- ◆ Toll-free technical support
- ◆ All products are user installable
- ◆ Manufacturer's warranties
- ◆ Thousands of products in stock
- ◆ APO/FPO, and International orders welcome
- ◆ Purchase orders accepted from Universities, Qualified Firms, and Government Agencies.
- ◆ Special pricing on volume orders

**DELIVERY GUARANTEED**



- ◆ Fast, inexpensive, dependable delivery to any worldwide destination with Federal Express.
- ◆ Same day shipping
- ◆ Overnight delivery available

◆ No surcharge on credit cards



**TOLL FREE FROM THE US OR CANADA**  
**800/535-5892**  
**INTERNATIONAL**  
**714/588-9866**

**FAX LINE**  
**714/588-9872**

**BUSINESS HOURS**  
**Monday-Friday, 8AM-5PM**  
**Saturday, 10AM-3PM, P.S.T.**



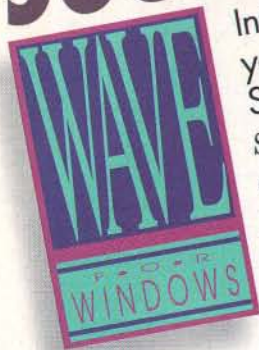
**First Source International**  
**36 Argonaut, Suite 140**  
**Aliso Viejo, CA 92656-1426**

Terms/Conditions: Memory products are third party, manufacturers' part numbers are for your convenience. Freight charges are non-refundable. A 20% restocking fee will be charged on all non-defective returns, unopened, and refused or cancelled orders. Items must be returned within 15 days with original documentation and packaging. A Returned Merchandise Authorization number is required. Prices and availability are subject to change without notice. Purchase prices at the time of order are final. First Source International cannot be responsible for errors in typography or photography. We will beat any advertised price valid only on identical brands, offer not good for SIMMs or DRAM. Trademarks and registered trademarks are of their respective companies.

**CALL TOLL FREE 800-535-5892**

**Circle 156 on Inquiry Card (RESELLERS: 157).**

# ATTENTION SOUND CARD OWNERS



Introducing WAVE™ for Windows—The Sound Editor for your Sound Blaster™, MultiSound™ or Pro Audio Spectrum Series™ Sound Card.

The tape is rolling . . . your personal recording studio is open whenever you want it to be. WAVE for Windows from Turtle Beach Systems allows you to be a master of sound. With WAVE, your Windows 3.1 compatible sound card becomes a creative tool rather than just a playback device. Reshape the music you create, assemble full multimedia presentations, even rearrange songs from your favorite discs. **Anything that can be recorded can be rearranged with WAVE for Windows . . . the word processor of sound.**



## TURTLE BEACH SYSTEMS

Cyber Center #33, 1600 Pennsylvania Avenue, York, PA (717) 843-6916 FAX: (717) 854-8319

MPC Logo, Sound Blaster Pro and Pro Audio Spectrum are registered trademarks of their respective holders. WAVE for Windows, MultiSound and the Turtle Beach logo are trademarks of Turtle Beach Systems Inc.



Circle 160 on Inquiry Card (RESELLERS: 161).

# Window Addressing.

Addressing and laser printing envelopes and labels from Windows™ used to be a pain. But no more.

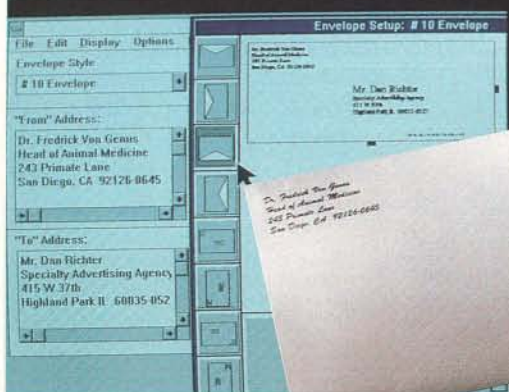
Now WinVelo™ lets you automatically capture addresses from a letter, set up your printer, and print envelopes and labels. Complete

with U.S. postal bar codes. All with the click of your mouse. And they'll look great, too. Because you can use any typeface or type size your HP LaserJet can print.

Use WinVelo as a stand alone or activate it from Ami Pro,™ Word-Perfect® or Microsoft® Word. It's completely

compatible with all standard size envelopes and Avery labels. And you can even import address files from most popular word processor, spreadsheet and database formats.

So take the pain out of printing envelopes and labels. At \$129 it's easy. Just call 1-800-432-WINN and order WinVelo today.



## WinVelo™

It Does Everything But Lick The Stamp.

from Duncan Clark Incorporated  
1401 Dove Street, Suite 560,  
Newport Beach, CA 92660  
1-800-432-WINN

© Duncan Clark Incorporated, 1992. All rights reserved. WinVelo is a trademark of Duncan Clark Incorporated. All other trademarks are property of their respective corporations.

# MEMORY... YOU JUST CAN'T DO WITHOUT IT.

## Picture this:

You bought a new software package. You try it out on your computer and soon find yourself working for hours on a sophisticated graphic design. While scrolling through your worksheet, it feels like you are moving through pudding. Your hard disk has a tough time trying to catch up. You then try to print, but the laser printer's buffer is full. You reset it, try again, and find that it spits out only part of your beautiful graphic....

## No problem!

We'll take it from here. With our **JetRam™** line that supports the leading brands of laser printers and **PcRam™** line that upgrades your Notebook, Laptop or Desktop computers, Transcend can help solve your memory problems.

## What you get from our memory upgrades

- Life time warranty on all our products
- Full memory lines support a variety of brand names of laser printers and PCs
- High quality at a reasonable price
- Easy-to-install

Office hours: 6:00 a.m. to 6:00 p.m. Mon. to Fri.

**"You order in the morning, we will ship in the afternoon."**

See us at

**COMDEX/Fall '92**

Booth #S1094



\* All brand names are registered trademarks of their respective owners.

## Transcend

Your Supplier, Your Partner,  
Your Friend.

## Transcend Information Inc.

104 Exchange Place,  
Pomona, CA 91768 U.S.A.  
TEL: (714) 598-5500  
FAX: (714) 598-5050, (714) 598-6050

3Fl., No. 465, Chung Hsiao East Road,  
Sec. 6, Taipei, Taiwan, R.O.C.  
TEL: (886) 2-7881000  
FAX: (886) 2-7881919, 7889191

# COPY SOFTWARE ILLEGALLY AND YOU COULD GET THIS HARDWARE ABSOLUTELY FREE.



Software piracy isn't just a crime. It's a shame. Because most people who do it aren't even aware that it's illegal. If you copy software that's protected by copyright, you could lose your job, face a civil suit, pay a \$100,000

fine and possibly be imprisoned. So get the facts now. To request more information, contact the Software Publishers Association at 1-800-388-7478. Because in a court of law, ignorance is one thing you won't be able to plead.

Please send me more information on the legal use of software.

Name \_\_\_\_\_  
Organization \_\_\_\_\_  
Title \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Please check software format you prefer if you would like to receive SPAudit, a software inventory management tool:

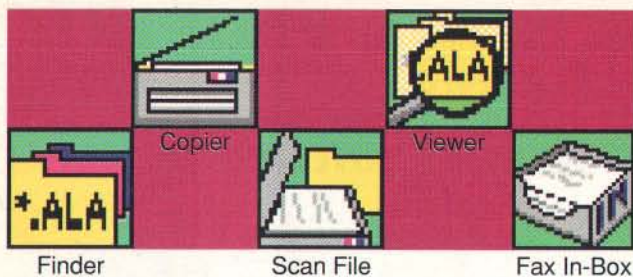
DOS 3.5'  DOS 5.25'  Macintosh\*

Mail to: Piracy Update, 1730 M Street, N.W.,  
Suite 700, Washington, D.C. 20036-4510

H-1

 **Don't Copy That Floppy**





## Office Equipment For Your Paperless Windows Desktop!

**File storage & retrieval system** for instant access to critical paper and fax documents

**Plain paper fax machine**

**Photocopier** - enlarges, reduces, and even autoseeds

**O.C.R. - Optical Character Recognition Software**, No more retyping

### FREE Video Brochure!

Call, fax or send for your copy today:

**1-800-ALACRITY** (252-2748)  
(908)813-2400 Fax: (908)813-2490

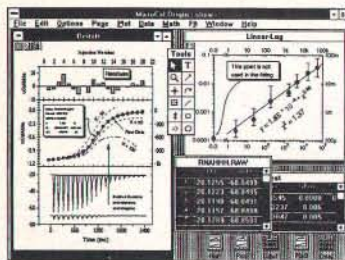
**Alacrity Desktop Document Manager**

Alacrity Systems Incorporated, 43 Newburg Rd., Hackettstown, NJ 07840 USA

Circle 168 (RESELLERS: 169) on Inquiry Card.

## New Origin™ Version 2.0

### Scientific Graphics and Data Analysis in Windows



"I have used SigmaPlot, EasyPlot, and several others. I would rate Origin at the very top... This is the best scientific software I have found... I love this product!"

Dr. Dipen N. Sinha  
Physicist  
Los Alamos National Laboratory

#### FEATURES INCLUDE:

- Many chart types, including line, scatter, column, bar, area, error bars, hi-lo-close, spline, step, box, QC charts, polar and waterfall plots.
- Create charts in multiple WYSIWYG windows with zooming, scrolling, and easy double-click editing of all graphic elements.
- Sophisticated "layer" system makes it easy to put multiple graphs on a page.
- Function plotting, statistics, t-Test, histogram, regression, curve fitting to user-defined models, and much more.
- Superior publication-quality output. Makes beautiful color slides.
- A powerful scripting language lets you create custom applications. Also supports DDE and DLL.
- Ideal for OEM Applications.

only **\$495.00**  
\$600 overseas

60-day money-back Guarantee  
Call **1-800-969-7720**

FREE demonstration disk available.

MicroCal, Inc., 22 Industrial Dr. E., Northampton, MA 01060  
TEL (413) 586-2013 FAX (413) 586-0149

Circle 183 on Inquiry Card.

## EM320

### WINDOWS

DEC VT320 Emulation for Microsoft Windows 3.X

- 132 column display
- Automatic window sizing
- Cut and paste
- Double high/wide characters
- Kermit file transfer
- LAT, INT 14 or TCP/IP support
- Windows style help
- Modem dialer/Phone book
- Local or ANSI color
- Command language
- Multiple instances
- International character sets

**Diversified Computer Systems, Inc.** (303) 447-9251  
FAX (303) 447-1406 Other products: EM320 DOS, Tektronix 4105 DOS

Circle 170 on Inquiry Card.

## FAX = SCANNER

### Enables your Fax machine to become a scanner!

\*Software & Hardware\*

\*\*Features\*\*

- Word-processor compatible
- Mouse compatible
- User friendly
- Phone book for easy fax dialing
- Edit graphics, images, photos and text
- Include all tools for a laser quality fax
- Folders for filing faxes and name cards
- Full page scanning

\*FX SCAN ONLY \$79.95\*



Available for IBM compatibles  
TO ORDER: 1-800-949-1292

Questions call: 1-714-468-5555  
Apple Version Coming Soon!



Circle 193 on Inquiry Card.

## WINTERM

### Terminal Emulation is Just the Beginning!

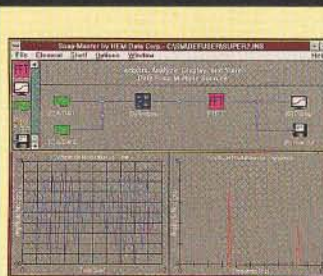
- The best DDE support in the business.
- Advanced Scripting lets you integrate host-based applications with local programs in a flash.
- WinTerm's Unique Application Development kit lets you write C-language DDLs to control WinTerm at a detailed level. The only truly extensible connectivity package on the market.
- Exceptionally faithful emulation of DEC VT series terminals.
- Unequaled connectivity: LAT, CTERM, TCP/IP (including WINSOCK), TES, INT14, NASI/NCSI, NETBIOS, and many more.

**Marketfield Software Development Corp.**

71 West Main Street, Oyster Bay, NY 11771 • (800) 753-3657 FAX (516) 624-7587

Circle 190 (RESELLERS: 191) on Inquiry Card.

## DATA ACQUISITION & ANALYSIS SOFTWARE



### Snap-Master for Windows

- Acquire low and hi-speed data concurrently with multiple A/D boards from different vendors
- Powerful time and frequency analysis with plotting
- Greater usable memory for more data and more features
- Takes full advantage of Microsoft Windows 3.x
- Supports I/O hardware by the leading manufacturers



HEM Data Corporation • Phone: (313) 559-5607 • Fax (313) 559-8008

Circle 172 (RESELLERS: 173) on Inquiry Card.

BYTE's Essential Guide to Windows • 1992 • 163

## INTELLIGENT DATA ACQUISITION

Now you can run high speed data acquisition under Windows™. A Data Acquisition Processor™ with on-board intelligence handles the critical part of an application: the tasks that run in real time. The DAP can be controlled from any Windows language or application that can make DLL calls. The one shown here is written in Visual Basic™ and uses only seven DLL functions.



**MICROSTAR  
LABORATORIES™**

Phone: (206) 453-2345  
or fax: (206) 453-3199

Circle 177 on Inquiry Card.

## EARN YOUR COLLEGE DEGREE AT HOME

## B.S. & M.S. In Computer Science

Get the opportunity and earning power a college degree confers—without leaving home and without spending thousands of dollars.

- Approved for tuition reimbursement by leading corporations
- ALL COURSES BY CORRESPONDENCE
- Most courses interactive
- Approved Ada course available
- Qualified instructors available on telephone help lines

**AMERICAN  
INSTITUTE  
OF  
COMPUTER  
SCIENCES**

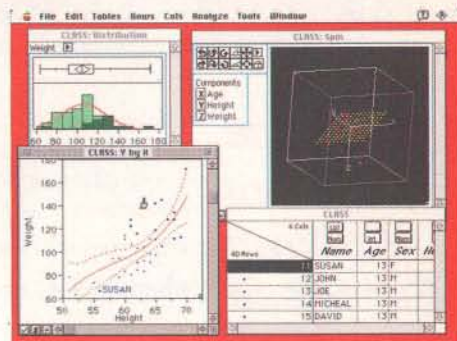
Phone: 1-205-323-6191 • FAX: 1-205-328-2229  
2101 BYX Magnolia Ave. • Suite 200 • B'ham, AL 35205

*The leading edge of learning*

## JMP® Statistical Discovery Software

*"This application can do the jobs of as many as six separate programs and do them all well. Yet it is not*

*overly complicated or bulky... We believe that JMP is an excellent value and will make short work of all but the most demanding mainframe-oriented data-analysis chores."*



**MacWEEK**



Call today for a free demo disk and Points of Interest from the leading name in data analysis software...SAS Institute Inc. 919-677-8000. Fax 919-677 8166.

JMP is a registered trademark of SAS Institute Inc. Copyright © 1992

Circle 179 on Inquiry Card.

Scientific Graphics

**GraphiC Features**

- Linear, log, polar, triangle plots
- Smith & bar charts
- Shaded contour & 3-D plots
- Export PIC, GEM, HPGL, TIFF files
- Source code for full control.
- 23 fonts, 16 symbols, 9 linestyles
- Simultaneous plots
- Insert one plot into another plot
- Color PostScript™, EPS
- High-resolution Tektronix® format
- Supports most printers, plotters, and graphics cards

*Licensed for personal use only*

**Scientific Endeavors**

508 North Kentucky St.  
Kingston, TN 37763  
(800) 998-1571  
(615) 376-4146 FAX: (615) 376-1571

Windows® version now available  
No windows programming required

"All of the C language routines you need to write an impressive scientific graphing program of your own. Highly Recommended."  
PC Magazine 3/14/89

Circle 180 on Inquiry Card.

Let your "true colors shine through" when you advertise your computer products in BYTE's **HARDWARE/SOFTWARE SHOWCASE** our newest, affordable, 4-color advertising section!

Call for more details:  
**(603) 924-2695 or (603) 924-2598**

Complete Solution In One Card

# SIGMA SIX™

96/24kbps send  
Receive  
Fax/Data  
Modem

2 Serial, 1 Parallel Ports      NE 2000 LAN

Flash Disk™  
(Flash Eprom)  
256K or 512K

IDE/Floppy  
Controller

SVGA  
1024x768  
Non-interlaced  
Supports 24Bit  
True Color  
with 16.8  
Million Colors

- Windows™ Accelerator—Windows 3.1/3.0 Compatible
- Software configurable interrupt lines (IRQ)—No hardware interrupts required. All functions can be enabled and disabled via software.
- Avoids Multi-board incompatibilities.
- Saves time and money.
- 30 days money back guarantee.
- 2 years warranty-board replacement.
- **MADE IN USA**

AMT®

**Advanced Micro Technology**  
123 University Pkwy  
Pomona, Ca. 91768  
Tel: (714) 598-6120 Fax: (714) 598-7716

Circle 187 on Inquiry Card.

## Subscription Problems?



We want to help!

If you have a problem with your BYTE subscription, write us with the details. We'll do our best to set it right. But we must have the name, address, and zip of the subscription (new and old address, if it's a change of address). If the problem involves a payment, be sure to include copies of the credit card statement, or front and back of cancelled checks. Include a "business hours" phone number if possible.

### BYTE Magazine

Attn. Subscriber Service, P.O. Box 555  
Hightstown, NJ 08520

## COM1: - COM4: WITH WINDOWS!



- 1, 2, OR 4 PORT RS-232 BOARDS
- RS-232 AND RS-422 VERSIONS
- WINDOWS UTILITY SOFTWARE PROVIDED
- XT AND AT INTERRUPT JUMPERS
- OTHER PRODUCTS INCLUDING LAPTOP ADD-ONS
- DELIVERY FROM STOCK
- MADE IN USA
- EXCELLENT TECHNICAL SUPPORT

**SEALEVEL**  
COMMUNICATIONS & I/O

SEALEVEL SYSTEMS INC.  
PO BOX 830  
LIBERTY, SC 29657  
**(803) 843-4343**

Circle 181 on Inquiry Card.

## PC/AT Four Port Com. Coprocessor

### GMM Sync4/CCP™

- High Performance 16 MHz 16 bit CPU.
- 80X86 code compatible.
- 4 Sync/Async Ports (2 Serial Ports with Full Duplex DMA).
- Uses Zilog 85C30, 85230 SCC chip.
- 512K Dual Ported Ram (STD) (1, 2, or 4 MEG Dual Port Ram - optional).
- 8k, 16k, 32k, 64k Window Size (Programmable).
- 8 Software Selectable and Shareable Interrupts.
- RS232/RS422/RS485
- Source Code Debugger Kit Available.



GMM Products Are All Made in USA.

PC/AT Dual Port Com. Coprocessor  
also available  
GMM Sync2/CCP™

**GMM**  
GMM Research Corporation

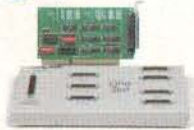
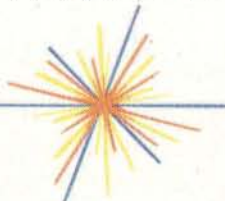
Other PC/AT & PS/2 8530 based products available.  
Extremely competitive pricing.

**(714)752-9447 Fax (714)752-7335**  
18092 Sky Park South - Unit E, Irvine CA 92714

Circle 171 on Inquiry Card.

Announcing...

# THE One Slot™



COMBINATION MULTIPORT BOARD  
with Single Slot Expansion: 3 parallel & 4 Serial Ports

Ideal for people who love their PCs but don't like running out of slots. Simple to install and use. Save slots & money. Perhaps the last I/O board you'll ever need.

### Features

- Supports Windows, Multimedia, OS/2, Novell, DOS and SCO Unix
- ISA, EISA compatibility
- Ports easily configured
- Easy connect remote panel
- Diagnostics software available. **Call 1-800-782-7428.**

**STAR GATE™**  
People and products  
you can depend on.

Star Gate Technologies, Inc. • 29300 Aurora Road • Solon, OH • 44139  
216-349-1860 • FAX: 216-349-2056 •  
BBS: 216-349-2904 • INTERNET: custsvc@sgtech.com

Circle 185 (RESELLERS: 186) on Inquiry Card.

## Plug into the Future

Digital Communication Lines  
at Costs Comparable to  
Regular Phone Lines  
and Speeds Five  
Times as Great.

Call us to order:

- Data Circuits
- Hardware
- Switch 56, T1

**POWERCOM**  
DATA COMMUNICATION SPECIALISTS  
**800-288-9807** • **FAX: 805-962-0104**

Authorized Sales Representative for:

**PACIFIC BELL MCI** AND OTHERS

Circle 192 on Inquiry Card.

## AT Systems in ROM

- Single Board Computers
- Run DOS code from ROM
- PC Code compatible
- Large Memory space
- Backplane systems



- Develop code on a PC. Run on our CPU cards with DOS and code in ROM. Use off-the-shelf expansion cards.
- KS6: NEC V53 CPU (286eq), 5 serial, 2 Par, Clock, AT bus, Max 4M Ram, 2M Rom, 512K NV Sram. \$349 (q1-oem ver).
- KS3: V40 CPU, 3 Serial, 2 Par, Clock, Flop, Kbd. \$249 (q1).

**303-444-7737 Fax 303-786-9983**  
655 Hawthorn Ave., Boulder CO 80304 U.S.A.

**KILA**

Circle 175 on Inquiry Card.

**Multimedia**

# Make Your Image Fly !

## Capturing, Compression and Printing.

**Video Blaster, Full Motion, True Color, Windowing Video Capture & Sound Controller**

- \*3 Switchable NTSC/PAL Video Inputs
  - \*720x512 Digitized Video Resolution
  - \*DIA Sound Mixer & Volume Control
  - \*Mixed Amplified Stereo Output of 0.5W
  - \*Versatile Utility for Captured Video Image Manipulation, Editing, Storage, Retrieval
- \$329**



- \*Windowing controlled by Independent X-Y coordinates & by Color Keying
- \*Independent X-Y Scaling
- \*Lots of Bundled Software!
- \*MS-Dos & Windows 3.X
- Dynamic Link Library Available

**Picture Packer, 30:1 Image Compression Software for Windows 3.0**

- \*Dramatically Saves Precious Hard Disk Space by 30:1 with Minimum Image Quality Loss and 5:1 with NO Image Quality Loss
  - \*Supports Full Color or Gray-Scale Image Files
  - \*Supports Windows 3.0 and MS-DOS 5.0
  - \*Adheres to JPEG Standards
  - \*Compatible with All Major Graphic File Format: TIFF, TARGA, PCX, GIF
- \$329**



- \*Memory-Resident Program Operates Transparently within Popular Applications such as:
  - Aldus Pagemaker
  - PhotoStyler
  - Picture Publisher
- to automatically Access and Decompress Picture Files.
- \*Affordable Price of \$99.00 with \$99.00 Coupon Toward Purchase of Packer Card

**WinPrinter, Cost Effective 800 DPI Laser Printing**

- \*Host-Based Processing. The More Powerful Your Computer, The Faster the Printing Speed.
- \*Made for Windows Printing
- \*Printing Versatility - 3 Ways with:
  - Windows Direct Driver, PostScript Emulator, PCL4
- \*800 DPI Laser Printing, 4 Page-Per Minute
- \*Upgrade Kit for your HP LaserJet Series Printers Available



For Order, Catalog and Price Quotes Call:

**1-800-446-1967**

Mon - Fri  
9am - 5pm



**Empire Computech**  
9668 Hermosa Ave.  
Rancho Cucamonga, CA 91730  
Tel: 714-466-1400 Fax: 714-466-1409

All trademarks are trademarks of their respective owners.

Circle 188 on Inquiry Card.

**Multimedia • Tape Drives**

# VIDEO CAPTURE

## IMAGER 2000

- Real time true color 768 x 576 x 24 for PC AT III **\$1495**
- Multistandard all 60-50 Hz NTSC, PAL, SECAM, VHS ...
- Complete with Windows 3 software, cables, ...
- Motion video preview in a window.
- External triggering, 3 video inputs, BMP, TIF, PCX...



- EXPANSION OPTIONS**
- 24 bits RGBS output with **GENLOCK** **\$ 395**
  - S-VHS, Hi-8, (Y/C input) **\$ 195**
  - JPEG S/W : image compression/decompression **\$ 249**
  - JPEG H/W : capture up to **30 frames per second !!!** **\$1795**

**VITEC** US & Canada TOLL FREE : 800 982 46 24  
EEC PH : 33 1 46 29 03 00 - FAX : 33 1 46 29 03 04

Circle 184 on Inquiry Card.

## Desktop 9-Track Tape Subsystem

### #1-selling 9-track system on desktop.



Qualstar's low cost 1/2-inch 9-track Streaming tape systems bring full ANSI data interchange to IBM AT, PS/2 or Macintosh, giving your micro the freedom to exchange data files with nearly any mainframe or minicomputer in the world.

Systems include DOS or Xenix compatible software, coupler card and cables. High reliability 1600 or 6250 BPI capability may be used for disk backup as well as data interchange.

**QUALSTAR**

Call us today! For details and to order: Fax (818) 882-4081  
Phone (818) 882-5822

9621 Irondale Ave., Chatsworth CA 91311

©1989 Qualstar Corp. All product and company names and trademarks are the exclusive property of their respective owners.

Circle 178 on Inquiry Card.

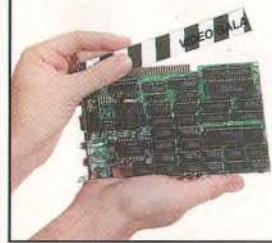
# VIDEO FRAME GRABBERS

RECORD TO VCR AND TV MONITORS. PC/XT/AT, PAL/NTSC

**VGA VIDEO GALA** .....\$695.00 Three boards in one: 1) It's a Super VGA card which replaces your existing card. 2) It has recordable output to VCRs & TVs. 3) Live TV/VCR video on your VGA monitor and frame grabbing in 24-bit color.

**HRT 512-8**.....\$995.00 Real time, grey scale frame grabber. This is a multifeatured high performance industrial model. (LUT, overlay, external trigger, EX/IN, pixel clock, genlockable, optional square pixels, video output...)

Applications include machine vision, medical imaging, robotics, microscopy etc. Resolution is 512 X 512 with 256 levels of grey (optional 2nd buffer or 640 X 512 res). Rock-solid capture even from a VCR. Library of Image processing routines included free. 100+ functions such as histograms, convolutions, edge detection, point and area operations, arithmetic and logical operations between frames, board control, IO, etc.



**HIGH RES TECHNOLOGIES INC.**

P.O. Box 76, Lewiston, New York 14092 U.S.A.  
Tel: 416-497-6493 Ext. 104 Fax: 416-497-1636 Dept. 104

Circle 174 on Inquiry Card.

## 9 Track/3480 Tape Subsystems

### 1/4" DAT 8mm Optical

#### New Windows Software Available

- Best Quality
  - Lowest Prices
- 800/1600/3200/6250 BPI  
**CALL 1-800-859-8856**



**Laguna Data Systems**

23151 Alcalde Drive, Suite B-3, Laguna Hills, CA 92653  
Tel: 714-586-3010, Fax: 714-586-5538



Circle 176 on Inquiry Card.

# SuperSound™

Digital Audio Authoring Workstations \$179 up.

Developers: Create Special Sounds for Windows / DOS

- \* LIKE HAVING A CASSETTE TAPE RECORDER IN A PC
- \* Fastest, easiest Editors - most features for the price.
- \* Quick, simple hardware / software installation.
- \* Use for FOREIGN LANGUAGE training / communications.
- \* Use for Engineering, Function Generators, Alarms, etc.
- \* DOS Extender version - Up to 16 MB working space.
- \* Complete Technical Support: Help on Digital Audio
- \* HARDWARE / SOFTWARE - NO extra charge!

**LOW-COST DIGITAL AUDIO for LAPTOPS**  
USA Made - Pro Quality, 30 Day Money-Back Guarantee  
by Silicon Shack Ph: 408-446-4521 Fax: 408-446-5196

4760 Castlewood Drive, San Jose, CA 95129

Tech. Info: 800-969-4411 Ask for FREE Product Catalog  
OEM DEVELOPERS: ADD QUALITY AUDIO HARDWARE TO YOUR PROJECT

Circle 182 on Inquiry Card.

# BYTE

Breaks the 4-Color Price Barrier with the Hardware/Software Showcase

See how affordable it is to advertise to BYTE's 500,000 computer professionals in this section!

Call for more advertising information:  
(603) 924-2695 or (603) 924-2598

## ACADEMIC COMPUTING

### LEARN PARALLEL PROCESSING Transputer Education Kit \$396

Kit includes ready-to-use PC add-in board with T400 transputer, 1MB of RAM, and PC interface. Complete with Occam2 and C compilers, assembler, source-level debuggers, example programs, and 1500 pages of documentation (incl. schematics). Expandable!

#### Computer System Architects

100 Library Plaza, 15 North 100 East, Provo UT 84606-3100  
(800) 753-4CSA (801) 374-2300 FAX (801) 374-2306

Inquiry 701.

## ACCESSORIES

### CUT RIBBON COSTS

Re-ink your printer ribbons quickly and easily. Do all cartridge ribbons with just one ink! For crisp, black professional print since 1982. You can choose from 3 models:

Manual E-Zee Inker—\$39.50  
Electric E-Zee Inker—\$94.50  
Ink Master (Electric)—\$189.00

1000s of satisfied users. Money-back guarantee.

#### BORG INDUSTRIES

525 MAIN ST., JANESVILLE, IA 50647  
1-800-553-2404 In IA: 319-987-2976

Inquiry 702.

### KEYBOARD, VIDEO, MOUSE, AUDIO

Extend signals from PC with **EXTENDER**  
Split signals with **COMPANION/PC EXPANDER**  
Switch signals among PCs with **COMMANDER**  
Boosts signals up to 600 feet. Control up to 96 PCs with one keyboard, monitor and mouse.

#### CYBEX CORPORATION

2800H Bob Wallace Ave., Huntsville, AL 35805  
Phone: 205-534-0011 Fax: 205-534-0010

Inquiry 703.

## AUDIO PROCESSING

New PC Talk Voice Recorder digitizes audio voice recordings.

- Windows™ 3.1 compatible
- Easy serial port installation
- Compressed voice files
- OLE support

#### DATAQ INSTRUMENTS, INC.

PH: 1-800-553-9006 / In OH: 1-216-668-1444  
FAX: 1-216-666-5434

COMDEX Booth # B1940

Inquiry 704.

## BAR CODE

### PRINT & READ BAR CODES!

The Standard Edition of KNOW-WEDGE for CODE 39 Complete with Stainless Steel Wand. Includes FREE bar code printing software!  
**ONLY \$159.00.**

For alternative hardware or software solutions

#### CALL

#### COMPUTER RESOURCES GROUP

629 Silverdale Drive, Claremont, CA 91711  
VOICE: (714) 624-8734 BBS: (714) 624-1054

Inquiry 705.

VARIANT MICROSYSTEMS  
**BAR CODE READERS DELIVER**  
WAND/LASER/MAGNETIC CARD CONNECTIVITY

- Keyboard wedges (Internal/External) for IBM PC/XT/AT, PS/2, and portables
- RS232 wedges for WYSE, Link, Kimtron terminals
- Bar code and label printing software
- Full two-year warranty
- 30-Day Money-Back Guarantee
- Extensive VAR/Dealer Discounts

46560 Fremont Blvd., Suite 206/Fremont, CA 94538/(510) 440-2870  
800-666-4BAR FAX: (510) 623-1372

Inquiry 706.

## BOOKS/TECHNICAL

### Here is your QUE

to great savings on new computer books

- Newest releases
- All major publishers
- Fast UPS delivery
- Free Catalog-on-a-Disk

Ziff-Davis—McGraw-Hill—Microsoft Press—Que—New Riders Press  
SAMS—Brady—Sybex—Addison Wesley—Ventana

Peach Pit Press—Bantam—Wiley—Van Nostrand—W.H. Freeman

• Discounts: 1 Book 25% OFF 3+ Books 30% OFF

Visa, MasterCard and Discover Card Accepted

#### README .DOC COMPUTER BOOKS

211 N. Second Street, Chambersburg, PA 17201

(800) 678-1473 Fax: (717) 264-8614

Inquiry 707.

## CAD

### AutoCAD Users

#### Increase your productivity with AutoMaster/PRO™

graphical display list software for rel. 10, 11, 12 & AEW

- icon menus • movable bird's eye view • real-time anti-aliasing • magnifying glass • real-time pan & zoom • Quick Menu • enhanced shading • supports Super VGA, XGA, TIGA and more at any resolution. Windows version available

Only \$295 Money-back guarantee

#### Call Vermont Microsystems

1-800-354-0055 1-802-655-2860

Inquiry 708.

## CD-ROM

### CD-ROM DRIVE & 10 FREE DISCS

High Performance CD-ROM drive:

DOS/MPC: Encyclopedia, Atlas, Mammals, Shareware, Danger Hot Stuff, Games II, Wild Places, World View, Crossword Cracker, Demonstration Disc. \$499.00 (Plus Freight)

Free Catalog (Overseas send \$5.00)  
Hundreds of discs and optical products.

#### CD ROM, Inc.

1667 Cole Blvd., #400, Golden, CO 80401

Orders: 800-821-5245

Questions: 303-231-9373 Fax: 303-231-9581

Inquiry 709.

## COMMUNICATIONS

### X.25, HDLC, SDLC, BSC

SDLA card and software provides "plug-in" synchronous link support for PCs which is inexpensive, easy to use and robust. Coprocessor architecture ensures reliable communications under any operating system at line speeds to 180kbps. Packages include protocol analyser, test and development software. OEM enquiries welcome.

Full function SNA emulation packages also available.

#### Sangoma Technologies Inc.

(416) 474-1990 1-800-388-2475

Inquiry 710.

## COMPUTER BOOKS

### COMPUTER BOOKS at a discount

15% discount. Latest books, 35 publishers.

Free catalog. UPS & international shipping.

CompuServe 70007.1333. GO CBK

From Internet: 70007.1333@compuserve.com

Windows, C++, O/S 2.0, UNIX, Mac, OOP

#### CompuBooks

Rt. 1, Box 271-D, Cedar Creek, TX 78612 USA

800-880-6818, 512-321-9652 voice & FAX

See us at Fall COMDEX Booth # 2294 in The Sands

Inquiry 711.

## COMPUTER SYSTEMS

### LOW-LOW-LOW

#### Computer Systems/Notebooks/Network Solutions

IBM-Apple-Compaq-AST-ALR-Everex-&others

SURAH 386/486 ISA/EISA-AMI/Mylex Motherboards

• CD ROMS • Tape Backup • Pocket FAX Modem LAN

Cards • Hard Drives/Floppy Drives • Memory/upgrades

• DRAMS, SIMM Modules • Laser Printers/Scanners

• Plotters & Digitizers • Software

#### SURAH inc.

44912 Osgood Road, Fremont CA 94539 USA

Phone: (510) 651-5101 Fax: (510) 651-5241

1-800-543-1001 Nationwide Orders

Inquiry 712.

## BUYER'S MART

### YOUR SALES MESSAGE

about the special computer product or service that you provide belongs in print

#### THE BUYER'S MART

can help you reach computer professionals and produce valuable inquiries for your company!

Call **Margot Gnade** for more information

603-924-2656

or

Fax: 603-924-2683

Inquiry 734.

## CROSS ASSEMBLERS

### CROSS ASSEMBLERS

Fast, reliable with unlimited length of source code. Conditional assembly, complete set of arithmetic and logical operators. Optional listing with sorted Cross-reference Table. Price \$100.00 each.

#### SIMULATOR-DEBUGGERS/DISASSEMBLERS

We offer excellent full-function simulators with built-in disassemblers for the 8048/49, 8051/52, 8080/85, and Z80 controllers, and now for the 8096 and 80C196, with their unique features fully supported. Prices from \$200 to \$300 each, with \$50.00 discounts for XASM + SIM packages.

#### Lear Com Company

2440 Kipling St., Ste. 206, Lakewood CO 80215  
(303) 232-2226 FAX (303) 232-6721

Inquiry 713.

## DATA/DISK CONVERSION

### CONVERSION SERVICES

Convert any 9-track magnetic tape to or from over 4000 formats including 3 1/2", 5 1/4", 8" disk formats & word processors. Disk-to-disk conversions also available. Call for more info. Introducing OCR Scanning Services.

#### Pivar Computing Services, Inc.

165 Arlington Hgts. Rd., Dept. #B

Buffalo Grove, IL 60089 (800) Convert

Inquiry 714.

## DEBUGGING TOOLS

### INTRCPT 256<sup>3</sup> Break Points

- ★ Find Undocumented Functions
- ★ Reverse Engineer
- ★ Real-Time Debug and Disassemble
- ★ Call, Trap, Monitor, and Log Interrupts
- ★ DOS 5.0 and Windows Enhanced Mode

\$99.00

#### HACKENSACK

P.O. Box 181386

(800) 325-4225 Arlington, TX 76096

Inquiry 714.

## DIAGNOSTIC

### "..PINPOINT ANY PC FAILURE."

John C. Dvorak, PC Magazine 7/30/92

Top-rated PocketPOST Power On Self-Test card with diagnostic software for ISA/EISA/Micro-Channel. 180-page book. Hones your trouble shooting skills. CALL NOW.

#### DATA DEPOT, Inc.

1710 Drew Street #5, Clearwater, FL 34615

1-800-275-1913

813-446-3402 FAX 813-443-4377

Inquiry 715.

## EDUCATION

### B.S. & M.S. In COMPUTER SCIENCE

The American Institute for Computer Sciences offers an in-depth correspondence program to earn your Bachelor of Science and Master of Science degrees in Computer Science at home. B.S. subjects covered are: MS/DOS, BASIC, PASCAL, C, Data File Processing, Data Structures & Operating systems. M.S. program includes subjects in Software Engineering and Artificial Intelligence.

#### AMERICAN INST. for COMPUTER SCIENCES

2101-BY Magnolia Ave. South, Ste. 200, Birmingham, AL 35205

800-767-2427 205-323-6191

Inquiry 716.

## ENTERTAINMENT

### Go, NEMESIS, Go

Go - a Zen game. So appealing, it has endured 4,000 years. So useful governments study it.

NEMESIS Go Junior entices novices of any age. NEMESIS Go Master Deluxe satiates the addicted. Windows, Macintosh and DOS versions available.

Chaos Manor User's Choice Award (BYTE/1990)

### Toyogo, Inc. (800) 869-6469

PO Box 25460-Y, Honolulu, HI 96825-0460  
(808) 396-5526 fax: (808) 396-4126

Inquiry 717.

## FLOW CHARTS

### WINDOWS FLOWCHARTER \$129

RFFlow 2.0 is a professional drawing tool for flowcharts & org. charts. Requires Microsoft Windows. 100 shapes auto adjust in size. Diagonal lines and curves. Auto line routing and re-routing. Click on a shape to bring up a sub-chart. Move charts to other apps. via the Clipboard. Call for free trial disk.

### RFF ELECTRONICS

1053 Banyan Court, Loveland, CO 80538

Phone: (303) 663-5767 FAX: (303) 669-4889

## HARDWARE/COMPUTERS

### SC/FOX™ EMBEDDED COMPUTERS

PC Parallel Coprocessor Plug-in Boards: 15 MIPS avg 50 MIPS burst, using the SC32 32-bit CPU or the 16-bit Harris RTX 2000™.

VME Master/Slave System Controller SBC: 18 MIPS avg 70 MIPS burst, uses RTX 2000 cpu, SCSI, 2 ser, 1 ptr ports, to 640K bytes.

Stand-Alone Single Board Computers: 18 MIPS avg 60 MIPS burst, 3U or 100x100mm Eurocard-size using either SC32 or RTX 2000.

Ideal for embedded real-time control, data acquisition, robotics, and signal processing. OEM software development system included.

### SILICON COMPOSERS INC (415) 322-8763

208 California Avenue, Palo Alto, CA 94306

Inquiry 718.

## PROGRAMMERS TOOLS

**DON'T DEVELOP NETWORK APPLICATIONS** without NPPC, a powerful library sub-routine package that handles all the details of NetBIOS or IPX programming! NPPC supports high-level program communications at the message level for all server/client and peer-to-peer models. If you are using C or Assembler, NPPC allows you to write a single application that runs on BOTH IPX AND NetBIOS without any modifications. NPPC is compatible with any true NetBIOS emulator, therefore applications written with NPPC will work with most LANs in the marketplace. We offer a 30 day money back guarantee.

NPPC for IPX or NetBIOS: \$195.00, with source: \$395.00

### SOFTWAREHOUSE CORPORATION

326 State Street, Los Altos, CA 94022

(415) 949-0203 FAX: (415) 949-0208

Inquiry 719.

### Boost Your (Visual) BASIC!

- ☛ New Dazzle/VB 256 color image control/DLL.
- ☛ Zoom, pan & resize multiple images!
- ☛ Adjust colors & custom palettes
- ☛ Save \$200 - just \$99 until 12/31/92!
- ☛ Call for 12 other VB, QB and C programming tools.

FREE DEMO Disk AND BOOKLET

### TeraTech, Inc. (800) 447-9120 x167

Dept 167 Suite 360, 3 Choke Cherry Rd., Rockville, MD 20850

Int'l (301) 330-6764 Fax (301) 963-0436 BBS (301) 963-7478

Inquiry 720.

## SECURITY

### FIGHT PIRACY!

★ EVERLOCK 3.0 ★

### SOFTWARE COPY PROTECTION

New Option Board Safe-New Remote Registration  
New CPU LOCK-CD ROM LOCK and more

★ EVERKEY HARDWARE LOCKS ★

### Az-Tech Software, Inc.

Call for a FREE Demo (800) 227-0644

201 East Franklin, Richmond, MO 64085  
(816) 776-2700 FAX (816) 776-8398

Inquiry 721.

## SHAREWARE

### SHAREWARE THE BEST FOR LESS!

- Shareware by floppy as low as \$1.69/disk
  - By CD ROM as low as \$29.95 each
  - Special low prices on CD ROM players
  - Call or write for Free Catalog
- ### ROCKET SHAREWARE
- PO Box 39326, Edina, MN 55439  
612-934-4775

Inquiry 722.

## SOFTWARE/DATA COMPRESSION

### Double your hard disk ZIPIT™

- Continuous floppy archive of huge files.
- Automatic creation of self-extract file.
- One-step imploding of directory trees.
- Transfer huge files between PCs.
- Shareware version available on BBSs.
- Send \$49. Visa/MC/Check/MO.

### DIRTRAN SYSTEMS INC.

PO BOX 1207, ROSLYN, PA 19001

Phone (800) 995-2501 Fax: (215) 659-2029

Inquiry 723.

## SOFTWARE/DOCUMENTATION

### Automated User Manuals Faster! Easier! Better!

- Interactive Structured System Cuts Documentation Time 50% to 80%
- Graphics, Fonts, Extensive Printing Options
- Manuals Include Table of Contents, Full Index, Getting Started, Reference, Tutorials and More!
- Just \$199.95! Call 1-800-221-8275 for Free Demo!

**DocMaker**  
Automated  
Documentation  
System

**Task Software Co.**  
2856 Falling Tree Circle  
Orlando, FL 32837  
407-826-0348

Inquiry 724.

## SOFTWARE/ENGINEERING

### Analog Circuit Simulation

- PC and Macintosh CAE
- Schematic Entry
- SPICE Simulator
- Monte Carlo Analysis
- Parameter Sweeping
- Filter Design
- Extensive Model Libraries
- Waveform Analysis
- Report-Quality Plotting
- Full SPICE programs starting at \$95. Complete systems from \$990.

Call for your Free Demo and information kit.

P.O. Box 710, San Pedro, CA 90733-0710

310-833-0710, FAX: 310-833-9658

**intusoft**

Inquiry 725.

## SOFTWARE/GRAPHICS

### TIFF, PCX, TARGA, GIF, DIB, BMP, DCX, EPS, WMF, WPG AccuSoft Image Format Library 2.0 Now includes image processing!

Import, export, convert, display, and print all 10 formats! DOS & Windows versions included in one package. No royalties. Includes several sample programs with source code. Supports all languages. **Format compatibility guaranteed!** G3, G4, TIFF-F, multi-page images etc. Rotate, scale, color reduction, sharpen etc. 30 day satisfaction guarantee. \$295

### AccuSoft Corporation

160 E. Main St., P.O. Box 1261, Westboro, MA 01581

(800) 525-3577 (508) 898-2770 FAX (508) 898-9662

Inquiry 726.

## SOFTWARE/SORT

### OPT-TECH SORT/MERGE

Extremely fast Sort/Merge/Select utility. Run as an MS-DOS command or CALL as a subroutine. Supports most languages and file types including Btrieve and dBASE. Unlimited file sizes, multiple keys and more! MS-DOS, Windows \$149. OS/2, XENIX, UNIX \$249.

(702) 588-3737

### Opt-Tech Data Processing

P.O. Box 678 - Zephyr Cove, NV 89448

Inquiry 727.

## SOFTWARE/VOICE/FAX

### MULTI-VOICE® TOOLS

Multi-Voice Tools is a complete development Toolkit for Pascal or "C" to access all the features for most speech processing boards available today. It helps you write MULTI-LINE VOICE APPLICATION systems in minutes. A number of programming examples are provided. All programs and libraries are delivered with source code. Dialogic, Rhetorex, Pika, VBX: \$599. Watson (Single Line): \$99. ALSO AVAILABLE: Fax Programmer's Toolkit (\$199). Based on CAS specifications. Visa/MC accepted.

### ITI Logiciel

4263 Cristophe-Colomb, Montreal, Quebec, Can. H2J 3G2  
TEL (514) 597-1692 FAX (514) 526-2362

Inquiry 728.

## STATISTICS

### WinSTAT™ Statistics for Windows

All the statistical methods you need, with all the convenience of Windows! Up to 65,000 variables and cases. Import/export Lotus, dBASE, etc. files. Copy & paste tables and graphs to word processor. Call for brochure and/or \$10 demo. V/MC/P.O.

### Kalmia Co. Inc.

Dept. 61, 71 Dudley St., Cambridge, MA 02140

Phone/FAX: (617) 864-5567

Inquiry 729.

## UTILITIES

### CURSOR EXCITEMENT

Cursorific! Pro makes those boring, hard-to-see cursors come alive. Change, even ANIMATE any Windows cursor. Design your own. Thrill to dancing cursors while your apps load. It's useful & fun! Software junkies love it! Includes 300+ cursors, 20 animations. Winner of BYTE User's Choice Award 9/92. Order now, \$39.95 + \$5 s/h.

### AApex Software

PO Box 13379, Reno, NV 89507

(800) 728-7650 FAX (702) 324-4578

Inquiry 730.

## COMPUTER MAPS

Map utility lets you locate addresses instantly. Just key in an address and see a street map on your screen with a dot marking the location. Pan/zoom/print the map. Software \$39 (DOS/Windows/Mac). Maps are \$15 per county.

### Graphic Advantage, Inc.

20380 Town Center Ln., #230, Cupertino, CA 95014

(408) 446-7092

Inquiry 731.

## WINDOWS

### HyperPhoto db - A HyperImage/document management system under MS-Windows™ 3.x

Displays multiple windows of images and documents in true color or with color matching. Associates text info, images or symbols to any pixel inside an image. Easily switches from image to image through successive levels of detail. Finds a point inside an image by entering its name e.g. address. Organize images and files in a network/relational database. Users can design their own information templates and search with multiple keys. Include a powerful editor, File security & Tressarch. Link to clipboard. Pan and zoom within images. Work with PCX, BMP, TIF, GIF, Postscript file Formats. Network Vers. Avail.

### Friendly Information Systems, Inc.

34 Bow Avenue, Dedham, MA 02026

(508) 486-0003 or (617) 329-1620

Inquiry 732.

### 88 WINDOWS® PROGRAMS

Buy this fantastic collection for only \$9.95. Features games, business, utilities, education, home and graphics programs for use in Windows®. Price includes shipping and handling. (Please add \$5.00 for foreign orders.) Credit Cards Only.

### SMC SOFTWARE PUBLISHERS

(619) 931-8111 ext. 511

Inquiry 733.

# YOUR DIRECT LINK

## ADVERTISER CONTACT INFORMATION

To order products or request FREE information, call advertisers directly or send in the Direct Link Card by mail or fax! Let them know you saw it in BYTE!

Inquiry No.		Page No.	Phone No.	Inquiry No.		Page No.	Phone No.
<b>A</b>				<b>M</b>			
61-62	ABACUS SOFTWARE	49	800-451-4319	144-145	MAG INNOVISION	21	800-827-3998
143	ACTIX SYSTEMS	52	800-927-5557	*	MARK WILLIAMS CO	65	800-627-5967
63	ADOBE SYSTEMS INC	41	800-833-6687	190-191	MARKETFIELD SOFTWARE	163	516-624-7575
64-65	ADVANCED LOGIC RESEARCH	77	714-581-6770	151-152	MEDIA RESOURCES	32	714-256-5048
187	ADVANCED MICRO TECH	164	714-598-6120	183	MICROCAL INC	163	413-586-7720
66	AITECH	36		103	MICROGRAFX	26	214-234-1769
168-169	ALACRITY SYSTEMS, INC	163	908-813-2400	*	MICROSOFT CORP	6,7	
67-68	ALTSYS CORP	64	800-477-2131	177	MICROSTAR LABORATORIES	164	206-453-2345
*	AME INSTIT FOR COMP SCI	164	205-323-6191	197	MITSUBISHI ELECT AMERICA	35	800-843-2515
69-70	AMERICAN MEGATRENDS	9	800-828-9264	198	MITSUBISHI ELECT AMERICA	37	800-843-2515
146	APPROACH SOFTWARE	51	800-APPROACH	193	MPI MARKETING	163	714-468-5555
<b>B</b>				<b>N</b>			
*	BIX	111	617-491-3342	104-105	NANAO USA CORP	56,57	310-325-5202
72-73	BORLAND INT'L	CIII	800-331-0877	158-159	NATIONAL DESIGN	155	800-253-8831
74-75	BORLAND INT'L	CIV	800-331-0877	106	NEC	42,43	800-366-0476
76-77	BORLAND INT'L	10,11	800-331-0877	107	NEW MEDIA GRAPHICS CORP	38	800-288-2207
154	BULLDOG COMPUTER PROD	154	800-438-6039	*	NORTHGATE COMPUTER SYS	67	800-345-8709
155	BUZZWORDS INT'L	158	314-334-6317	<b>O</b>			
*	BYTE EURODECK	109	603-924-2533	200-201	OMNICOMP GRAPHICS CORP	157	713-464-2990
*	BYTE REPRINTS	78	603-924-2525	108-109	ORCHID TECHNOLOGY	101	
*	BYTE SUB MESSAGE	112		<b>P</b>			
<b>C</b>				110-111	PERISCOPE COMPANY, THE	95	800-722-7006
78	CANON USA INC	58	800-221-3333	112	PERSOFT INC	68	800-368-5283
79	CAPITAL EQUIPMENT CO	62	800-234-4232	113-114	POLARIS SOFTWARE	23	619-674-6500
80	COMPUCLASSICS	30	800-827-1994	115	POPKIN S/W & SYSTEMS INC	44	212-571-3434
81	COMPUTER ASSOCIATES	CII,1	800-CALL-CAI	192	POWERCOM	165	800-288-9807
82	COREL SOFTWARE	99	800-836-SCSI	*	PROGRAMMER'S PARADISE	73	800-445-7899
142	CREATIVE LABS INC	39	800-998-LABS	*	PROGRAMMER'S SHOP	82,83	800-421-8006
83-84	CTX INTERNATIONAL INC	118	714-595-6146	<b>Q</b>			
<b>D</b>				101-102	QMS	3-5	800-422-2769
170	DIVERSIFIED COMPUTER	163	303-447-9251	116	QUA TECH INC	152	800-553-1170
167	DUNCAN CLARK INC	160	800-432-9466	178	QUALSTAR CORP	166	818-882-5822
<b>E</b>				<b>R</b>			
141	ELOGRAPHICS	60		117	RAIMA CORP	89	800-327-2462
188	EMPIRE COMPUTECH	166	800-446-1967	118-119	RAINBOW TECHNOLOGIES	79	800-852-8569
194-195	ESRI	107	714-793-2853	199	ROSE ELECTRONICS	28	800-333-9343
<b>F</b>				<b>S</b>			
156-157	FIRST SOURCE INT'L	159	714-588-9866	179	SAS INSTITUTE INC	164	919-677-8000
85-86	FRONTIER TECHNOLOGIES	40	414-241-4555	180	SCIENTIFIC ENDEAVORS	164	800-998-1571
149-150	FUNK SOFTWARE	94	617-497-6339	181	SEALEVEL SYSTEMS INC	165	803-843-4343
87-88	FUTURESOFT ENGINEERING	60	713-496-9400	196	SIGMA DATA	64	800-446-4525
<b>G</b>				182	SILICON SHACK	166	800-969-4411
89-90	GLENCO ENGINEERING	123	800-562-2543	185-186	STARGATE TECHNOLOGIES	165	800-782-7428
171	GMM RESEARCH CORP	165	714-752-9447	122-123	STATSOFT	117	918-583-4149
<b>H</b>				120-121	STB SYSTEMS	135	
91	HAUPPAUGE COMP WORKS	31	800-443-6284	124	STORAGE DIMENSIONS	53	800-765-7895
172-173	HEM DATA	163	313-559-5607	125	STRATEGIC MAPPING	125	408-985-7400
92	HERCULES COMPUTER TECH	91	800-532-0600	139	SYMANTEC	17	800-228-4122
93	HEWLETT PACKARD	14,15	800-554-1305	138	SYMANTEC	54	800-228-4122
174	HIGH-RES TECHNOLOGIES	166	416-497-6493	128-129	SYSTAT INC	29	708-864-5670
*	HONEYWELL KEYBOARD DIV (N.A.)	109	800-445-6939	<b>T</b>			
94-95	HONEYWELL KEYBOARD DIV (N.A.)	111	800-445-6939	130-131	TOUCHSTONE SOFTWARE	126	714-969-7746
<b>I</b>				163-164	TRANSCEND INFO INC	161	714-598-5500
96	IBM/LEXMARK	24,25	800-358-7662	132	TURBOPOWER SOFTWARE	46	800-333-4160
*	INTELLIGENCE WARE	156	800-888-2996	160-161	TURTLE BEACH SYSTEMS	160	717-843-6916
97-98	IO COMM	93	310-644-6100	<b>V</b>			
<b>J</b>				133-134	VENTURA SOFTWARE INC	18,19	800-822-8221
99	JAMECO ELECTRONICS	69	800-831-4242	135-136	VIEWSONIC	47	310-944-3041
<b>K</b>				184	VITEC S.A.	166	33-146-29-03-04**
100	KEA SYSTEMS LTD	48	800-663-8702	<b>W</b>			
175	KILA	165	303-444-7737	137	WATCOM PRODUCTS INC	59	800-265-4555
<b>L</b>				<b>Z</b>			
176	LAGUNA DATA SYSTEMS	166	800-859-8856	140	ZYLAB/DIVISION OF IDI	134	800-544-6339
126-127	LANDMARK RESCH INT'L CORP	61	800-683-6696	147-148	ZYXEL USA	81	714-693-0808

\* Correspond directly with company.  
\*\* Indicates FAX Number





# YOUR DIRECT LINK

## PRODUCT CATEGORY INDEX

For FREE product information from individual advertisers, circle the corresponding inquiry numbers on your Direct Link Card!

To receive information for an entire product category, circle the category number on your Direct Link Card!

Category No. Inquiry No.	Page No.	Category No. Inquiry No.	Page No.	Category No. Inquiry No.	Page No.	
155	BUZZWORDS INTERNATIONAL	158		113-114	POLARIS SOFTWARE	23
110-111	PERISCOPE COMPANY, THE	95		*	PROGRAMMER'S PARADISE	73
115	POPKIN S/W & SYSTEMS INC	44		139	SYMANTEC	17
*	PROGRAMMER'S SHOP	82,83		133-134	VENTURA SOFTWARE INC	18,19
118-119	RAINBOW TECHNOLOGIES	79		184	VITEC S.A.	166
137	WATCOM PRODUCTS INC	59		140	ZYLAB/DIVISION OF IDI	134
<b>41 SECURITY</b>				<b>48 WORD PROCESSING/DTP</b>		
89-90	GLENCO ENGINEERING	123		167	DUNCAN CLARK INC	160
118-119	RAINBOW TECHNOLOGIES	79		140	ZYLAB/DIVISION OF IDI	134
<b>45 UNIX</b>				<b>GENERAL</b>		
*	MARK WILLIAMS CO	65		<b>51 MISCELLANEOUS</b>		
<b>46 UTILITIES</b>				*	BYTE EURODECK	109
126-127	LANDMARK RESEARCH INT'L CORP	61		*	BYTE REPRINTS	78
138	SYMANTEC	54		*	BYTE SUB MESSAGE	112
130-131	TOUCHSTONE SOFTWARE	126				
132	TURBOPOWER SOFTWARE	46				
<b>47 WINDOWS</b>						
168-169	ALACRITY SYSTEMS, INC	163				
67-68	ALTSYS CORPORATION	64				
146	APPROACH SOFTWARE	51				
81	COMPUTER ASSOCIATES	CI1,1				
170	DIVERSIFIED COMPUTER	163				
167	DUNCAN CLARK INC	160				
85-86	FRONTIER TECHNOLOGIES	40				
100	KEA SYSTEMS LTD	48				
151-152	MEDIA RESOURCES	32				
183	MICROCAL INC	163				
*	MICROSOFT CORP	6,7				
177	MICROSTAR LABORATORIES	164				
104-105	NANAO USA CORP	56,57				
112	PERSOFT INC	68				

### BYTE ADVERTISING SALES STAFF

Jennifer L. Bartel, National Sales Manager, 14850 Quorum Drive, Suite 380, Dallas, TX 75240, Tel. (214) 701-8496  
Liz Coyman, Inside Advertising Sales Director, One Phoenix Mill Lane, Peterborough, NH 03458, Tel. (603) 924-2518

#### NEW ENGLAND

ME, NH, VT, MA, RI, CT, ONTARIO  
CANADA & EASTERN CANADA  
Michael Lamatina (617) 860-6344  
Patricia Payne (603) 924-2654  
McGraw-Hill Publications  
24 Hartwell Avenue  
Lexington, MA 02173  
FAX: (617) 860-6899

#### SOUTHEAST

NC, SC, GA, FL, AL, TN, MS, AR, LA, KY  
MaryAnn Goulding (404) 843-4782  
McGraw-Hill Publications  
4170 Ashford-Durwoody Rd., Suite 520  
Atlanta, GA 30319  
FAX: (404) 252-4056

#### SOUTHWEST,

ROCKY MOUNTAIN  
CO, OK, TX  
Jennifer Walker (214) 701-8496  
Barry Echavarría (603) 924-2574  
McGraw-Hill Publications  
14850 Quorum Dr., Suite 380  
Dallas, TX 75240  
FAX: (214) 991-6208

#### NORTH PACIFIC: Campbell, CA

SILICON VALLEY, HI, WA, AK,  
W. CANADA  
Bill McAfee (408) 879-0381  
Jonathan Sawyer (603) 924-2665  
McGraw-Hill Publications  
1999 South Bascom Ave., Suite 210  
Campbell, CA 95008  
FAX: (408) 879-9067

#### SOUTH PACIFIC: Costa Mesa, CA

ORANGE COUNTY  
SAN DIEGO COUNTY  
Beth Dudas (714) 753-8140  
Joseph Mabe (603) 924-2662  
McGraw-Hill Publications  
15635 Alton Pkwy., Suite 290  
Irvine, CA 92718  
FAX: (714) 753-8147

#### EAST COAST

NY, NYC, NJ, DC, DE, MD, VA, WV, PA  
Kim Norris (212) 512-2645  
Arlene Casey (212) 512-2368  
Barry Echavarría (603) 924-2574  
McGraw-Hill Publications  
1221 Avenue of Americas—  
28th Floor  
New York, NY 10020  
FAX: (212) 512-2075

#### MIDWEST

IL, MO, KS, IA, ND, SD, MN,  
WI, NE, IN, MI, OH  
Kurt Kelley (312) 616-3328  
Ed Ware (603) 924-2664  
McGraw-Hill Publications  
Two Prudential Plaza  
180 North Stetson Ave.  
Chicago, IL 60601  
FAX: (312) 616-3370

#### NORTH PACIFIC: San Francisco, CA

NORTHERN CA, OR, ID, MT,  
WY, NORTHERN NV, UT  
Roy J. Koops (415) 954-9728  
Joseph Mabe (603) 924-2662  
McGraw-Hill Publications  
425 Battery Street  
San Francisco, CA 94111  
FAX: (415) 954-9786

#### SOUTH PACIFIC: Los Angeles, CA

LOS ANGELES COUNTY, AZ,  
NM, SOUTHERN NEVADA  
Alan El Faye (213) 480-5243  
Jonathan Sawyer (603) 924-2665  
McGraw-Hill Publications  
3333 Wilshire Boulevard #407  
Los Angeles, CA 90010  
FAX: (213) 480-5249

#### Regional Advertising

Brian Higgins (603) 924-2651  
Larry Levine (603) 924-2637  
BYTE Publications  
One Phoenix Mill Lane  
Peterborough, NH 03458

Peterborough, NH Office: Inside Sales FAX: 603-924-2683 Advertising FAX: 603-924-7507

#### Hardware/Software Showcase

Mark Stone (603) 924-2695  
Ellen Perham (603) 924-2598  
BYTE Publications  
One Phoenix Mill Lane  
Peterborough, NH 03458

#### The Buyer's Mart (L-2)

Margot Gnade (603) 924-2656  
BYTE Publications  
One Phoenix Mill Lane  
Peterborough, NH 03458

#### BYTE Deck

Brad Dixon (603) 924-2596  
BYTE Publications  
One Phoenix Mill Lane  
Peterborough, NH 03458

#### EURO-DECK

James Bail (603) 924-2533  
BYTE Publications  
One Phoenix Mill Lane  
Peterborough, NH 03458

#### BYTE International Direct Response Postcards

Ellen Perham (603) 924-2598  
BYTE Publications  
One Phoenix Mill Lane  
Peterborough, NH 03458

### INTERNATIONAL ADVERTISING SALES STAFF

Ron Cordek, Managing Director, European Operations  
McGraw-Hill Publishing Co., Wimbledon Bridge House, One Hartfield Road, Wimbledon, London SW19 3RU, England, Tel: 44 81 545 6278, Fax: 44 81 545 6294

#### GERMANY, SWITZERLAND,

AUSTRIA  
Christina Barion  
McGraw-Hill Publishing Co.  
Wimbledon Bridge House  
One Hartfield Road  
Wimbledon, London SW19 3RU  
England  
Tel: 44 81 545 6270  
FAX: 44 81 545 6294  
TELEX: 892191

#### UNITED KINGDOM

Michele Hams (44 81 545 6269)  
Christina Barion (44 81 545 6270)  
McGraw-Hill Publishing Co.  
Wimbledon Bridge House  
One Hartfield Road  
Wimbledon, London SW19 3RU  
England  
FAX: 44 81 545 6294  
TELEX: 892191

#### SCANDINAVIAN COUNTRIES

Zena Coupé  
A-Z International Sales Ltd.  
70 Chalk Farm Road  
London NW1 8AN  
England  
Tel: 44 71 284 3171  
FAX: 44 71 284 3174

#### JAPAN

Masaki Mori  
Transworld Media Inc.  
4th Floor, 1-26-6 Kamimeguro  
Meguro-ku, Tokyo 153, Japan  
Tel: 81-3-5721-0761  
FAX: 81-3-5721-0762

#### SINGAPORE

Derek Ng  
Stephen Tay  
Acer TWP Corp.  
1123 Serangoon Road, #03-01  
Singapore 1232  
Tel: 011-65-298-6166  
FAX: 011-65-298-7551

#### HONG KONG

Candice Lo  
Acer TWP Corp.  
Unit 2, 6F Hing Wah Center  
82-84 To Kwa Wan Road  
Kowloon, Hong Kong  
Tel: 011-852-764-3830  
FAX: 011-852-764-3857

#### BENELUX

Ellen Pardede  
Batenburg 105  
3437 AB Nieuwegein  
The Netherlands  
Tel: 31 34 02 49496  
FAX: 31 34 02 37944

#### FRANCE, ITALY

Zena Coupé, Amanda Blaskett  
A-Z International Sales Ltd.  
70 Chalk Farm Road  
London NW1 8AN  
England  
Tel: 44 71 284 3171  
FAX: 44 71 284 3174

#### ISRAEL

Dan Ehrlich  
Ehrlich Communication Int'l.  
P.O. Box 99  
Herzliya 46101, Israel  
Tel: 972-52-586 245  
Tel: 972-52-586 246  
FAX: 972-52-585 685

#### KOREA

Young-Seoh Chinn  
JES MEDIA INTL.  
5th Floor, Bangpo Bldg.  
40-7, Chamwon-Dong, Seocho-Gu  
Seoul 137-030, Korea  
Tel: 011-(82) 545-9001/2  
FAX: 011-(82) 2 549-8851

#### MALAYSIA

Servex (Malaysia) Sdn. Bhd.  
H.K. Lin  
5th Floor, Bena Tower  
160, Jalan Ampang  
50450 Kuala Lumpur, Malaysia  
Tel: (03) 262-4592  
FAX: (03) 262-4591

#### INDIA, INDONESIA,

PAKISTAN, PHILIPPINES,  
TAIWAN, OTHER ASIAN  
AND PACIFIC COUNTRIES  
K. T. Wu  
Acer TWP Corp.  
2nd Fl., No. 19-1, Lane 231  
Fu Hsing North Road  
Taipei 10445, Taiwan  
R.O.C.  
Tel: 011-(886) 2 713 6959  
FAX: 011-(886) 2 715 1950

#### AUSTRALIA

Rod Tremain  
Rod Tremain Media  
45 Pymble Ave.  
Pymble 2073, Sydney  
Australia  
Tel: 2-988-3339  
FAX: 2-988-3424

#### THAILAND

Jack Hu  
28/1 Prapawit Bldg., Surasak Rd.  
Silom, Bangkok 10500  
Thailand  
Tel: 662-236-0295  
FAX: 662-236-5960

# EDITORIAL INDEX

For more information on any of the companies covered in articles, columns, or news stories in this issue, circle the appropriate inquiry number on Your Direct Link Card. Each page number refers to the first page of the article or section in which the company name appears.

Inquiry No.	Page No.	Inquiry No.	Page No.	Inquiry No.	Page No.	Inquiry No.	Page No.
<b>A</b>		<b>D</b>		<b>M</b>		<b>Q</b>	
1116, Adobe Systems	133,	Dataquest	12	1291 Macromedia	141	1350 Que Software	151
1296,	142, 147	990 Datastorm	131	1288 MathSoft	140	<b>R</b>	
1327		Technologies		1108 Matrox Electronic	84	1143 Radius	84
999, Aldus	132, 133,	DEC	6, 12	Systems		The Redmond	12
1117,	135, 144	992, Delrina	131, 138	1222 Media Cybernetics	97	Group	
1123,		1275 Technology		991 Microcom	131	1346 Reference Software	150
1310		1345 DeScribe	55, 150	1121, Micrografx	55, 97,	International	
1129 Amaze	136	1337 Diagsoft	149	1124,	134, 135, 136,	<b>S</b>	
Apple Computer	12, 55	1105 Diamond Computer	84	1126,	142, 144, 145	1338 Saber Software	149
993 Approach Software	131	Systems		1223,		Sharp	12
978, Asymetrix	129	986, Digital	130	1300,		Software Products	132
979,		989 Communications		1309,		International	
981		Associates		1312		997, Software Publishing	6,
AT&T	12	1287 Digitaltalk	140	1061, Microsoft	6, 12, 27, 33,	1133,	104, 132,
1336 Atech Software	148	Draw and Designer	55	1113,	45, 55, 63, 70,	1315,	145, 151
982 Autodesk	129	<b>F</b>		1115,	119, 132, 133,	1349	
1340 Automated Design	149	1330 Fifth Generation	148	1128,	136, 138, 139,	1134, Spinnaker	104, 138
Systems		984 Foresight	130	1170,	141, 143, 145,	1277 Software	
<b>B</b>		Resources		1276,	146, 147, 151	Sun Microsystems	12
1299 Banner Blue	142	1120 Fractal Design	134	1279,		976, Symantec	104, 113,
Software		1112 Frame Technology	132	1282,		1062,	119, 128, 136,
1127 Berkeley Systems	136	987 FutureSoft	130	1283,		1130,	140, 146, 148
1328, Bitstream	147, 148	<b>G</b>		1292,		1135,	
1329		1106 Genoa Systems	84	1293,		1166,	
980, Borland International	6,	GeoWorks	12	1302,		1285,	
995,	45, 55, 70,	Go Corp.	12	1316,		1321,	
1168,	129, 131, 139,	1290 Gold Disk	141	1320,		1322,	
1280,	140, 147	Grid Systems	12	1324,		1333,	
1281,		996 Gupta	131	1348		1334,	
1284,		Technologies		Mips Computer	6	1335	
1286,		<b>H</b>		Systems		1351 Systems	151
1325		1164 hDC Computer	113			Compatibility	
<b>C</b>		1107 Hercules Computer	84	<b>N</b>		<b>T</b>	
1295 Caere	141	Technology		1109 National Design	84	1318 3-D Visions	146
988, Calera Recognition	130,	1165, Hewlett-Packard	113,	1306 NewQuest	143	1167, Tool Technology	113,
1298 Systems	142	1332	148	Technologies		1341 Publishing	149
1307 Campbell Services	144	<b>I</b>		1317 New Vision	145	1344 Truevision	84
985 cc:Mail	130	IBM	6, 12, 33, 55	Technologies		<b>V</b>	
1271 Channel Computing	136	1326 Informix Software	147	1294 NISCA	141	1114 Ventura Software	133
1313 Claris	145	1331 Inset Systems	148	Novell	27	1145 VideoLogic	84
994, Computer	97, 104,	Intel	6, 12, 27, 33	1110 Number Nine	84	<b>W</b>	
1060, Associates	119, 131,	1304 Intuit	143	Computer		1289 Wolfram Research	140
1131, International	139, 143,	983 IsiCAD	130	<b>O</b>		1352 WordPerfect	6, 12,
1221,	144, 146	<b>J</b>		1142 Opta	84	55, 151	
1278,		1274 JetForm	138	Oracle	6	1353 WordStar	151
1301,		<b>K</b>		<b>P</b>		International	
1311,		Kaleida	12	1303 Peachtree	143	<b>X</b>	
1319		977 Knowledge Garden	128	Software		1342 XTree	149
Computer	12	<b>L</b>		Pen Computing	12	<b>Z</b>	
Intelligence		1297 Logitech	142	1272 Pilot Software	138	1339 Zenographics	149
1118 Computer Support	133	1132, Lotus Development	12,	1308 Polaris	144	1122, ZSoft	97, 134, 136
1305 Contact Software	143	1169,	45, 70, 112,	1111, Power Up	132, 138	1125,	
International		1314,	145, 147, 150	1273 Software		1224	
1119 Corel Systems	55, 133	1323,				1343 ZyLab	150
		1344,					
		1347					

# YOUR DIRECT LINK CARD

For free product information, mail your completed card today. For quicker response, fax to 1-413-637-4343!

Yes, I want FREE information on the following products!

## 1. Circle the Numbers on Your Direct Link Card

Circle the numbers which are found on ads and articles in this issue or circle the product category number and receive information on all advertisers listed in that category.

## 2. Print Your Name and Address

Answer questions "A" through "E" and mail or fax card to 1-413-637-4343.

## 3. Product information will be rushed to you from the selected companies!

Fill out this coupon carefully. Please Print.

Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Company \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ Country \_\_\_\_\_ Code \_\_\_\_\_  
 Phone \_\_\_\_\_ Fax \_\_\_\_\_

A. What is your primary job function/principal area of responsibility? (Check one)

- 1  MIS/DIP
- 2  Programmer/Systems Analyst
- 3  Administration/Management
- 4  Sales/Marketing
- 5  Engineer/Scientist
- 6  Other

B. What is your level of management responsibility?

- 7  Senior-level
- 8  Middle-level
- 9  Professional

C. Are you a reseller (VAR, VAD, Dealer, Consultant)?

- 10  Yes
- 11  No

D. What operating systems are you currently using? (Check all that apply)

- 12  PC/MS-DOS
- 13  DOS + Windows
- 14  OS/2
- 15  Unix
- 16  MacOS
- 17  VAX/VMS

E. For how many people do you influence the purchase of hardware or software?

- 18  1-25
- 19  26-50
- 20  51-99
- 21  100 or more

Windows 1992 90 96 99

Product Category Information	Disks & Optical Drives	7	Multimedia	19	Educational	30	Shareware	42
Circle the numbers below for information on the entire category of products you're interested in.	Diskettes/Duplicators	8	Printers/Plotters	20	Engineering/Scientific	31	Software Duplication	43
<b>Hardware</b>	Fax Boards/Machines	9	Programmable Hardware	21	Entertainment	32	Spreadsheets	44
Accessories/Supplies	Graphics Tablets/Mice/ Pen Input	10	Scanners/OCR/Digitizers	22	Graphics	33	Unix	45
Add-in Boards	Keyboards	11	Tape Drives	23	Macintosh	34	Utilities	46
Bar Coding	LAN Hardware	12	UPS	24	Mail Order	35	Windows	47
Communications/Networking	Laptops & Notebooks	13	<b>Software</b>		Mathematical/Statistical	36	Word Processing	48
Computer Systems	Mail Order	14	Business	25	Miscellaneous Software	37	<b>General</b>	
Data Acquisition	Memory/Chips/Upgrades	15	CAD/CAM	26	On-Line Services	38	Books/Publications	49
	Miscellaneous Hardware	16	Communications/Networking	27	Operating Systems	39	Recruitment	50
	Modems/Multiplexors	17	Data Acquisition	28	Programming Languages/Tools	40	Miscellaneous	51
	Monitors & Terminals	18	Database	29	Security	41		

### Inquiry Numbers 52-233

52 78 104 130 156 182 208  
 53 79 105 131 157 183 209  
 54 80 106 132 158 184 210  
 55 81 107 133 159 185 211  
 56 82 108 134 160 186 212  
 57 83 109 135 161 187 213  
 58 84 110 136 162 188 214  
 59 85 111 137 163 189 215  
 60 86 112 138 164 190 216  
 61 87 113 139 165 191 217  
 62 88 114 140 166 192 218  
 63 89 115 141 167 193 219  
 64 90 116 142 168 194 220  
 65 91 117 143 169 195 221  
 66 92 118 144 170 196 222  
 67 93 119 145 171 197 223  
 68 94 120 146 172 198 224  
 69 95 121 147 173 199 225  
 70 96 122 148 174 200 226  
 71 97 123 149 175 201 227  
 72 98 124 150 176 202 228  
 73 99 125 151 177 203 229  
 74 100 126 152 178 204 230  
 75 101 127 153 179 205 231  
 76 102 128 154 180 206 232  
 77 103 129 155 181 207 233

### Inquiry Numbers 409-590

409 435 461 487 513 539 565  
 410 436 462 488 514 540 566  
 411 437 463 489 515 541 567  
 412 438 464 490 516 542 568  
 413 439 465 491 517 543 569  
 414 440 466 492 518 544 570  
 415 441 467 493 519 545 571  
 416 442 468 494 520 546 572  
 417 443 469 495 521 547 573  
 418 444 470 496 522 548 574  
 419 445 471 497 523 549 575  
 420 446 472 498 524 550 576  
 421 447 473 499 525 551 577  
 422 448 474 500 526 552 578  
 423 449 475 501 527 553 579  
 424 450 476 502 528 554 580  
 425 451 477 503 529 555 581  
 426 452 478 504 530 556 582  
 427 453 479 505 531 557 583  
 428 454 480 506 532 558 584  
 429 455 481 507 533 559 585  
 430 456 482 508 534 560 586  
 431 457 483 509 535 561 587  
 432 458 484 510 536 562 588  
 433 459 485 511 537 563 589  
 434 460 486 512 538 564 590

### Inquiry Numbers 766-947

766 792 818 844 870 896 922  
 767 793 819 845 871 897 923  
 768 794 820 846 872 898 924  
 769 795 821 847 873 899 925  
 770 796 822 848 874 900 926  
 771 797 823 849 875 901 927  
 772 798 824 850 876 902 928  
 773 799 825 851 877 903 929  
 774 800 826 852 878 904 930  
 775 801 827 853 879 905 931  
 776 802 828 854 880 906 932  
 777 803 829 855 881 907 933  
 778 804 830 856 882 908 934  
 779 805 831 857 883 909 935  
 780 806 832 858 884 910 936  
 781 807 833 859 885 911 937  
 782 808 834 860 886 912 938  
 783 809 835 861 887 913 939  
 784 810 836 862 888 914 940  
 785 811 837 863 889 915 941  
 786 812 838 864 890 916 942  
 787 813 839 865 891 917 943  
 788 814 840 866 892 918 944  
 789 815 841 867 893 919 945  
 790 816 842 868 894 920 946  
 791 817 843 869 895 921 947

### Inquiry Numbers 1123-1304

1123 1149 1175 1201 1227 1253 1279  
 1124 1150 1176 1202 1228 1254 1280  
 1125 1151 1177 1203 1229 1255 1281  
 1126 1152 1178 1204 1230 1256 1282  
 1127 1153 1179 1205 1231 1257 1283  
 1128 1154 1180 1206 1232 1258 1284  
 1129 1155 1181 1207 1233 1259 1285  
 1130 1156 1182 1208 1234 1260 1286  
 1131 1157 1183 1209 1235 1261 1287  
 1132 1158 1184 1210 1236 1262 1288  
 1133 1159 1185 1211 1237 1263 1289  
 1134 1160 1186 1212 1238 1264 1290  
 1135 1161 1187 1213 1239 1265 1291  
 1136 1162 1188 1214 1240 1266 1292  
 1137 1163 1189 1215 1241 1267 1293  
 1138 1164 1190 1216 1242 1268 1294  
 1139 1165 1191 1217 1243 1269 1295  
 1140 1166 1192 1218 1244 1270 1296  
 1141 1167 1193 1219 1245 1271 1297  
 1142 1168 1194 1220 1246 1272 1298  
 1143 1169 1195 1221 1247 1273 1299  
 1144 1170 1196 1222 1248 1274 1300  
 1145 1171 1197 1223 1249 1275 1301  
 1146 1172 1198 1224 1250 1276 1302  
 1147 1173 1199 1225 1251 1277 1303  
 1148 1174 1200 1226 1252 1278 1304

### Inquiry Numbers 234-408

234 259 284 309 334 359 384  
 235 260 285 310 335 360 385  
 236 261 286 311 336 361 386  
 237 262 287 312 337 362 387  
 238 263 288 313 338 363 388  
 239 264 289 314 339 364 389  
 240 265 290 315 340 365 390  
 241 266 291 316 341 366 391  
 242 267 292 317 342 367 392  
 243 268 293 318 343 368 393  
 244 269 294 319 344 369 394  
 245 270 295 320 345 370 395  
 246 271 296 321 346 371 396  
 247 272 297 322 347 372 397  
 248 273 298 323 348 373 398  
 249 274 299 324 349 374 399  
 250 275 300 325 350 375 400  
 251 276 301 326 351 376 401  
 252 277 302 327 352 377 402  
 253 278 303 328 353 378 403  
 254 279 304 329 354 379 404  
 255 280 305 330 355 380 405  
 256 281 306 331 356 381 406  
 257 282 307 332 357 382 407  
 258 283 308 333 358 383 408

### Inquiry Numbers 591-765

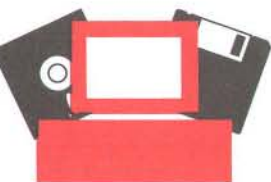
591 616 641 666 691 716 741  
 592 617 642 667 692 717 742  
 593 618 643 668 693 718 743  
 594 619 644 669 694 719 744  
 595 620 645 670 695 720 745  
 596 621 646 671 696 721 746  
 597 622 647 672 697 722 747  
 598 623 648 673 698 723 748  
 599 624 649 674 699 724 749  
 600 625 650 675 700 725 750  
 601 626 651 676 701 726 751  
 602 627 652 677 702 727 752  
 603 628 653 678 703 728 753  
 604 629 654 679 704 729 754  
 605 630 655 680 705 730 755  
 606 631 656 681 706 731 756  
 607 632 657 682 707 732 757  
 608 633 658 683 708 733 758  
 609 634 659 684 709 734 759  
 610 635 660 685 710 735 760  
 611 636 661 686 711 736 761  
 612 637 662 687 712 737 762  
 613 638 663 688 713 738 763  
 614 639 664 689 714 739 764  
 615 640 665 690 715 740 765

### Inquiry Numbers 948-1122

948 973 998 1023 1048 1073 1098  
 949 974 999 1024 1049 1074 1099  
 950 975 1000 1025 1050 1075 1100  
 951 976 1001 1026 1051 1076 1101  
 952 977 1002 1027 1052 1077 1102  
 953 978 1003 1028 1053 1078 1103  
 954 979 1004 1029 1054 1079 1104  
 955 980 1005 1030 1055 1080 1105  
 956 981 1006 1031 1056 1081 1106  
 957 982 1007 1032 1057 1082 1107  
 958 983 1008 1033 1058 1083 1108  
 959 984 1009 1034 1059 1084 1109  
 960 985 1010 1035 1060 1085 1110  
 961 986 1011 1036 1061 1086 1111  
 962 987 1012 1037 1062 1087 1112  
 963 988 1013 1038 1063 1088 1113  
 964 989 1014 1039 1064 1089 1114  
 965 990 1015 1040 1065 1090 1115  
 966 991 1016 1041 1066 1091 1116  
 967 992 1017 1042 1067 1092 1117  
 968 993 1018 1043 1068 1093 1118  
 969 994 1019 1044 1069 1094 1119  
 970 995 1020 1045 1070 1095 1120  
 971 996 1021 1046 1071 1096 1121  
 972 997 1022 1047 1072 1097 1122

### Inquiry Numbers 1305-1479

1305 1330 1355 1380 1405 1430 1455  
 1306 1331 1356 1381 1406 1431 1456  
 1307 1332 1357 1382 1407 1432 1457  
 1308 1333 1358 1383 1408 1433 1458  
 1309 1334 1359 1384 1409 1434 1459  
 1310 1335 1360 1385 1410 1435 1460  
 1311 1336 1361 1386 1411 1436 1461  
 1312 1337 1362 1387 1412 1437 1462  
 1313 1338 1363 1388 1413 1438 1463  
 1314 1339 1364 1389 1414 1439 1464  
 1315 1340 1365 1390 1415 1440 1465  
 1316 1341 1366 1391 1416 1441 1466  
 1317 1342 1367 1392 1417 1442 1467  
 1318 1343 1368 1393 1418 1443 1468  
 1319 1344 1369 1394 1419 1444 1469  
 1320 1345 1370 1395 1420 1445 1470  
 1321 1346 1371 1396 1421 1446 1471  
 1322 1347 1372 1397 1422 1447 1472  
 1323 1348 1373 1398 1423 1448 1473  
 1324 1349 1374 1399 1424 1449 1474  
 1325 1350 1375 1400 1425 1450 1475  
 1326 1351 1376 1401 1426 1451 1476  
 1327 1352 1377 1402 1427 1452 1477  
 1328 1353 1378 1403 1428 1453 1478  
 1329 1354 1379 1404 1429 1454 1479



# YOUR DIRECT LINK CARD

For free product information, mail your completed card today. **For quicker response, fax to 1-413-637-4343!**

See reverse side for card.

## 1. Circle the Numbers on Your Direct Link Card

Circle the numbers which are found on ads and articles in this issue or circle the product category number and receive information on all advertisers listed in that category.

## 2. Print Your Name and Address

Answer questions "A" through "E" and mail or fax card to 1-413-637-4343.

## 3. Product information will be rushed to you from the selected companies!

**BYTE**  
TNT MAILFAST  
FRG/BOS/700252/MO1  
P.O. Box 66  
Hounslow  
TW5 9RT  
England

PLACE  
POSTAGE  
HERE



**BYTE** McGraw Hill

# YOUR DIRECT LINK CARD

For free product information, mail your completed card today. For quicker response, fax to 1-413-637-4343!

Yes, I want FREE information on the following products!

## 1. Circle the Numbers on Your Direct Link Card

Circle the numbers which are found on ads and articles in this issue or circle the product category number and receive information on all advertisers listed in that category.

## 2. Print Your Name and Address

Answer questions "A" through "E" and mail or fax card to 1-413-637-4343.

## 3. Product information will be rushed to you from the selected companies!

Fill out this coupon carefully. Please Print.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Country \_\_\_\_\_ Code \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

A. What is your primary job function/principal area of responsibility? (Check one)

- 1  MIS/DIP  
 2  Programmer/Systems Analyst  
 3  Administration/Management  
 4  Sales/Marketing  
 5  Engineer/Scientist  
 6  Other

B. What is your level of management responsibility?

- 7  Senior-level 9  Professional  
 8  Middle-level

C. Are you a reseller (VAR, VAD, Dealer, Consultant)?

- 10  Yes 11  No

D. What operating systems are you currently using? (Check all that apply)

- 12  PCMS-DOS 15  Unix  
 13  DOS + Windows 16  MacOS  
 14  OS/2 17  VAX/VMS

E. For how many people do you influence the purchase of hardware or software?

- 18  1-25 20  51-99  
 19  26-50 21  100 or more

Windows 1992  90  96  99

Product Category Information	Hardware	Software	Education	Shareware
Disks & Optical Drives	1	19	30	42
Diskettes/Duplicators	2	20	31	43
Fax Boards/Machines	3	21	32	44
Graphics Tablets/Mice/	4	22	33	45
Pen Input	5	23	34	46
Keyboards	6	24	35	47
LAN Hardware	7	25	36	48
Laptops & Notebooks	8	26	37	49
Mail Order	9	27	38	50
Memory/Chips/Upgrades	10	28	39	51
Miscellaneous Hardware	11	29	40	
Modems/Multiplexers	12	30	41	
Monitors & Terminals	13	31		
	14	32		
	15	33		
	16	34		
	17	35		
	18	36		
		37		
		38		
		39		
		40		
		41		

**Inquiry Numbers 52-233**

52	78	104	130	156	182	208
53	79	105	131	157	183	209
54	80	106	132	158	184	210
55	81	107	133	159	185	211
56	82	108	134	160	186	212
57	83	109	135	161	187	213
58	84	110	136	162	188	214
59	85	111	137	163	189	215
60	86	112	138	164	190	216
61	87	113	139	165	191	217
62	88	114	140	166	192	218
63	89	115	141	167	193	219
64	90	116	142	168	194	220
65	91	117	143	169	195	221
66	92	118	144	170	196	222
67	93	119	145	171	197	223
68	94	120	146	172	198	224
69	95	121	147	173	199	225
70	96	122	148	174	200	226
71	97	123	149	175	201	227
72	98	124	150	176	202	228
73	99	125	151	177	203	229
74	100	126	152	178	204	230
75	101	127	153	179	205	231
76	102	128	154	180	206	232
77	103	129	155	181	207	233

**Inquiry Numbers 409-590**

409	435	461	487	513	539	565
410	436	462	488	514	540	566
411	437	463	489	515	541	567
412	438	464	490	516	542	568
413	439	465	491	517	543	569
414	440	466	492	518	544	570
415	441	467	493	519	545	571
416	442	468	494	520	546	572
417	443	469	495	521	547	573
418	444	470	496	522	548	574
419	445	471	497	523	549	575
420	446	472	498	524	550	576
421	447	473	499	525	551	577
422	448	474	500	526	552	578
423	449	475	501	527	553	579
424	450	476	502	528	554	580
425	451	477	503	529	555	581
426	452	478	504	530	556	582
427	453	479	505	531	557	583
428	454	480	506	532	558	584
429	455	481	507	533	559	585
430	456	482	508	534	560	586
431	457	483	509	535	561	587
432	458	484	510	536	562	588
433	459	485	511	537	563	589
434	460	486	512	538	564	590

**Inquiry Numbers 766-947**

766	792	818	844	870	896	922
767	793	819	845	871	897	923
768	794	820	846	872	898	924
769	795	821	847	873	899	925
770	796	822	848	874	900	926
771	797	823	849	875	901	927
772	798	824	850	876	902	928
773	799	825	851	877	903	929
774	800	826	852	878	904	930
775	801	827	853	879	905	931
776	802	828	854	880	906	932
777	803	829	855	881	907	933
778	804	830	856	882	908	934
779	805	831	857	883	909	935
780	806	832	858	884	910	936
781	807	833	859	885	911	937
782	808	834	860	886	912	938
783	809	835	861	887	913	939
784	810	836	862	888	914	940
785	811	837	863	889	915	941
786	812	838	864	890	916	942
787	813	839	865	891	917	943
788	814	840	866	892	918	944
789	815	841	867	893	919	945
790	816	842	868	894	920	946
791	817	843	869	895	921	947

**Inquiry Numbers 1123-1304**

1123	1149	1175	1201	1227	1253	1279
1124	1150	1176	1202	1228	1254	1280
1125	1151	1177	1203	1229	1255	1281
1126	1152	1178	1204	1230	1256	1282
1127	1153	1179	1205	1231	1257	1283
1128	1154	1180	1206	1232	1258	1284
1129	1155	1181	1207	1233	1259	1285
1130	1156	1182	1208	1234	1260	1286
1131	1157	1183	1209	1235	1261	1287
1132	1158	1184	1210	1236	1262	1288
1133	1159	1185	1211	1237	1263	1289
1134	1160	1186	1212	1238	1264	1290
1135	1161	1187	1213	1239	1265	1291
1136	1162	1188	1214	1240	1266	1292
1137	1163	1189	1215	1241	1267	1293
1138	1164	1190	1216	1242	1268	1294
1139	1165	1191	1217	1243	1269	1295
1140	1166	1192	1218	1244	1270	1296
1141	1167	1193	1219	1245	1271	1297
1142	1168	1194	1220	1246	1272	1298
1143	1169	1195	1221	1247	1273	1299
1144	1170	1196	1222	1248	1274	1300
1145	1171	1197	1223	1249	1275	1301
1146	1172	1198	1224	1250	1276	1302
1147	1173	1199	1225	1251	1277	1303
1148	1174	1200	1226	1252	1278	1304

**Inquiry Numbers 234-408**

234	259	284	309	334	359	384
235	260	285	310	335	360	385
236	261	286	311	336	361	386
237	262	287	312	337	362	387
238	263	288	313	338	363	388
239	264	289	314	339	364	389
240	265	290	315	340	365	390
241	266	291	316	341	366	391
242	267	292	317	342	367	392
243	268	293	318	343	368	393
244	269	294	319	344	369	394
245	270	295	320	345	370	395
246	271	296	321	346	371	396
247	272	297	322	347	372	397
248	273	298	323	348	373	398
249	274	299	324	349	374	399
250	275	300	325	350	375	400
251	276	301	326	351	376	401
252	277	302	327	352	377	402
253	278	303	328	353	378	403
254	279	304	329	354	379	404
255	280	305	330	355	380	405
256	281	306	331	356	381	406
257	282	307	332	357	382	407
258	283	308	333	358	383	408

**Inquiry Numbers 591-765**

591	616	641	666	691	716	741
592	617	642	667	692	717	742
593	618	643	668	693	718	743
594	619	644	669	694	719	744
595	620	645	670	695	720	745
596	621	646	671	696	721	746
597	622	647	672	697	722	747
598	623	648	673	698	723	748
599	624	649	674	699	724	749
600	625	650	675	700	725	750
601	626	651	676	701	726	751
602	627	652	677	702	727	752
603	628	653	678	703	728	753
604	629	654	679	704	729	754
605	630	655	680	705	730	755
606	631	656	681	706	731	756
607	632	657	682	707	732	757
608	633	658	683	708	733	758
609	634	659	684	709	734	759
610	635	660	685	710	735	760
611	636	661	686	711	736	761
612	637	662	687	712	737	762
613	638	663	688	713	738	763
614	639	664	689	714	739	764
615	640	665	690	715	740	765

**Inquiry Numbers 948-11**

# YOUR DIRECT LINK CARD

For free product information, mail your completed card today. **For quicker response, fax to 1-413-637-4343!**

See reverse side for card.

## 1. Circle the Numbers on Your Direct Link Card

Circle the numbers which are found on ads and articles in this issue or circle the product category number and receive information on all advertisers listed in that category.

## 2. Print Your Name and Address

Answer questions "A" through "E" and mail or fax card to 1-413-637-4343.

## 3. Product information will be rushed to you from the selected companies!

**BYTE**  
TNT MAILFAST  
FRG/BOS/700252/MO1  
P.O. Box 66  
Hounslow  
TW5 9RT  
England

PLACE  
POSTAGE  
HERE



**BYTE** COMPUTER

It's a fact!

# 2 out of 3 Windows spreadsheet users prefer Quattro Pro for a very simple reason

## An independent study proves it!

It's a fact! Two out of three Windows spreadsheet users tested prefer Quattro Pro for Windows. That is the result of a study conducted by Usability Sciences Corporation, a leading independent productivity research lab used by major software publishers, including Lotus.

Quattro Pro for Windows is the most advanced, yet easiest-to-use spreadsheet ever created for the personal computer. Thanks to the use of new object-oriented technology, Borland has radically simplified the use of the world's most feature-rich spreadsheet.

## Switching is easy

Stepping up to Quattro Pro is fast, simple, and painless. Your 1-2-3 files and publishing styles move effortlessly into Quattro Pro. You can even run your 1-2-3 macros.

The Usability Sciences study provides overwhelming proof that when 1-2-3 users just like you try Quattro Pro, they want to switch. Try Quattro Pro today, and make your own comparison. If you don't prefer it, return it. We'll give you your money back.

## Other spreadsheets don't compare

FEATURE	QPW	EXCEL 4.0	1-2-3/W R1.1
<b>ORGANIZATION</b>			
Spreadsheet Notebooks	Y	N	N
Nameable Tabs	Y	N	N
Group Formatting on Selected Pages	Y	Y	N
True 3-D Consolidation	Y	N	Y
<b>EASE OF USE</b>			
Right Mouse Button Formatting	Y	Y	N
Object Inspectors	Y	N	N
Context-sensitive SpeedBars	Y	Y	Y
SpeedFill and SpeedFormat	Y	Y	Y*
Drag and Drop	Y	Y	N
<b>GRAPHICS AND PRESENTATIONS</b>			
3-D Graphs	Y	Y	N
Slide Show with Light Table	Y	N	N
Live Linked Graph Types and Formatting in Slide Shows	Y	N	N
<b>DATABASE ACCESS</b>			
Live View of Networked Database Tables	Y	N	N
Database Desktop	Y	N	N
<b>CUSTOMIZATION</b>			
Macro Buttons on Spreadsheet	Y	Y	N
Visual User Interface Builder	Y	N	N
<b>COMPATIBILITY</b>			
Reads Quattro Pro, Excel, 1-2-3 Files and Styles (including Allways & Impress)	Y	N	N
Runs Your QPro & 1-2-3 Macro†	Y	N	N
<b>ANALYSIS</b>			
Optimizer	Y	Y	Y

\*Requires add-in.

†Some 1-2-3 macros may require modification.

# Quattro Pro for Windows is the spreadsheet ever

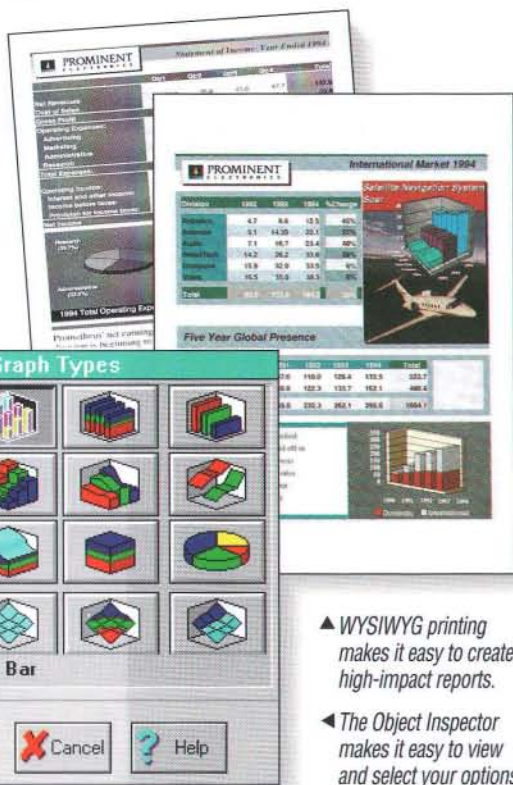
Notebooks

Object Inspector

Database Access

1-2-3 Compatibility

Windows Offer



- ▲ *WYSIWYG printing makes it easy to create high-impact reports.*
- ◀ *The Object Inspector makes it easy to view and select your options.*

## The easiest-to-use spreadsheet ...

Quattro Pro for Windows is the most advanced, yet easiest-to-use spreadsheet ever created for the personal computer. Thanks to the use of new object-oriented technology, Borland has radically simplified the use of the world's most feature-rich spreadsheet. With Quattro Pro for Windows you get your work done faster because you work visually. Simple point-and-click operations are all that's needed to complete any spreadsheet task—from building your spreadsheet to creating dazzling graphical reports.

## ...is also the most powerful

Never before has so much spreadsheet power also meant this much user productivity. Spreadsheet Notebooks and Object Inspector menus are breakthrough concepts that make it easy to tap the awesome functionality of Quattro Pro.



Only Quattro Pro for Windows gives you transparent access to database information. Borland's unique Database Desktop lets you view, edit, and copy dBASE and Paradox tables directly from within Quattro Pro. Plus, we've included all the tools you'll ever need for creating your own custom spreadsheet applications.

## Don't settle for second best

Get the spreadsheet from the company that J.D. Power® and Associates ranks #1 (tied with WordPerfect) in Customer Satisfaction Among Business Users.\* Get Borland's Quattro Pro for Windows today!

*Special limited-time offer!*  
**Quattro Pro for Windows and DOS**  
**Now together for the price of one.**  
*See your dealer today or call now,*  
**1-800-331-0877, ext. 5771**

The advertisement includes a circular seal that says '90-DAY MONEY-BACK GUARANTEE'. Below the seal are two software boxes: 'QUATTRO PRO FOR WINDOWS' and 'QUATTRO PRO FOR DOS'. The Windows box features a 'WINDOWS' logo. At the bottom of the boxes, it says 'BORLAND'.

# B O R L A N D

*Software Craftsmanship*

\*1991 J.D. Power and Associates 1991 Computer End User Satisfaction Study for Application Software Publisher: Phase IV: Business End User Summary. Responses from Business End Users at 4,396 business sites. Photo furnished by Cessna Aircraft Company. Copyright © 1992 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. Quattro Pro for Windows and Spreadsheet Notebooks have patents pending. Microsoft is a registered trademark of Microsoft Corporation. BI 4379

Circle 72 on Inquiry Card (RESELLERS: 73).



# Quattro Pro for Windows the most usable spreadsheet

Quattro Pro for Windows - INTL-MKT.WB1

File Edit Block Data Tools Graph Property Window Help

Consolidated:E10 @SUM(Avionics:B4..B8)

Division	1992	1993	1994	%Change
Robotics	4.7	8.6	12.5	45%
Avionics	5.1	14.3	22.1	55%
Audio	7.1	16.7	23.4	40%
SmartTech	14.2	26.2	33.6	28%
Computer	15.9	32.0	33.9	6%
Video	16.5	35.8	38.5	8%
<b>Total</b>	<b>63.5</b>	<b>133.6</b>	<b>164.0</b>	<b>23%</b>

**PROMINENT ELECTRONICS** International Market 1994

Satellite Navigation Systems Soar

Robotics Avionics Audio SmartTech Computer Video

2-D 3-D Rotate Combo Text

Print Format Query Data Compare 92-93 Compare 93-94

Consolidated Robotics Avionics Audio SmartTech Computer Video

**Quattro Pro for Windows** *the most usable spreadsheet ever made. Built with Borland's renowned object-oriented technology, Quattro® Pro for Windows is packed with hot new features you won't find in any other spreadsheet.*

**NEW!** Spreadsheet Notebooks with customizable Tabs are nothing less than a revolution in spreadsheet ease of use. Now you can intuitively organize and manage your spreadsheet data.

**NEW!** Object Inspector™ menus end the hassle of searching through menus. They're simpler than 1-2-3. Just click the right mouse button anywhere on the screen to get a list of what you can change and change it right there.

**NEW!** Database Desktop™ is the easiest way to incorporate dBASE® and Paradox® data into your spreadsheet. Just what you'd expect from Borland, the leader in database technology.

**NEW!** SpeedFill™ and SpeedFormat™ slash setup time by automatically filling in spreadsheet headings and formats.

**NEW!** SpeedBars™ are context-sensitive and customizable. SpeedBar icons give you pushbutton access to your most frequently used commands.

**NEW!** Presentation Graphics and drawing tools that rival those of Freelance and Harvard Graphics are built-in. You don't need to buy a separate graphics package.

**YES!** Compatible with Lotus 1-2-3 files, macros, and publishing styles and with Excel .XLS files.

2 in 1

# Borland makes you an **OUTRAGEOUS** spreadsheet offer!

## Get the best in both worlds

Imagine! Getting the world's best Windows spreadsheet *and* best DOS spreadsheet together for the price you would ordinarily pay for just one. It's an offer only Borland would make, and we call it WinDOS.™

## Get new Quattro Pro for Windows with Spreadsheet Notebooks

Quattro® Pro for Windows is packed with hot new features you won't find in any other spreadsheet. Innovative new



Spreadsheet Notebooks™ with nameable tabs let you build, organize, and manage your spreadsheets more easily than

ever before. Object Inspector™ menus give you a simple yet powerful new way to access features. And Quattro Pro's legendary presentation graphics rival the capabilities of standalone graphics packages. There's easy access to external database information and powerful new analytical tools for better decision making. Plus, a complete set of tools for creating your own custom applications. All this and more make Quattro Pro for Windows the most advanced and usable spreadsheet ever.



## Quattro Pro for Windows and DOS

## Now together for the price of one.

See your dealer today or call now,  
**1-800-331-0877, ext. 5771,**  
and put the best spreadsheets  
in the world to work for you.

*This is a limited-time offer—act now!*

You also get  
"Quattro Pro 4.0...the  
ultimate DOS spreadsheet"

—InfoWorld,  
April 1992



Quattro Pro for  
DOS has won more  
awards for excellence  
than any spreadsheet

in history. Its unique combination of  
pushbutton spreadsheet power and  
Intelligent Graphs has already made  
millions of users switch to Quattro Pro.

## Outstanding Lotus 1-2-3 compatibility

Quattro Pro not only reads and writes  
your 1-2-3 files, it also provides out-  
standing support for your 1-2-3 publish-  
ing styles, including Allways, Impress,  
and WYSIWYG. There's no easier way  
to make the transition to a great  
Windows spreadsheet than with the  
Quattro Pro WinDOS offer.

## The WinDOS offer

The Quattro Pro WinDOS offer makes  
your move from DOS to Windows fast  
and easy. It lets you move to Windows  
at your own pace. Or use both—  
Windows on the office computer and  
DOS for the laptop or home PC. Either  
way, you win. But an offer this outra-  
geous won't last forever. Get Quattro  
Pro WinDOS today and get the best in  
both worlds.

**B O R L A N D**  
Software Craftsmanship

Circle 74 on Inquiry Card (RESELLERS: 75).